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REACTIONS TO X-RAY AND RADIUM THERAPY IN THE TREATMENT OF CANCER OF THE UTERINE CERVIX

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THE reactions of the human organism as a whole and of individual tissues as entities to irradiation as available by radium and by high voltage roentgen rays are of great importance, since, at the present time, irradiation is either the treatment of choice or the only treatment possible for a large variety of malignant tumors. It is well known that malignant tumors are more susceptible to the gamma rays of radium and x-rays than are normal tissues. Indeed, it is upon the basis of this differential effect that the use of irradiation for malignant disease depends. Theoretically, it should be possible to destroy *any* malignant tumor by irradiation if one could arrange to deliver a sufficient amount to all parts of the tumor. From a practical point of view, this is often not possible because of the limiting effect of the surrounding normal tissues. Not infrequently, in an effort to deliver a lethal dose of irradiation to the tumor, surrounding normal tissues are overradiated, producing a variety of unfortunate effects which vary from those of minor degree to such marked tissue alterations that death of the patient may follow. The radiation therapist is constantly seeking to raise his dose level to efficient proportions without overradiating normal tissues. On the other hand, another puzzling variable which adds to the difficulty of determining the proper dose is that of irradiation sensitivity. The same amount of irradiation does not produce identical tissue reactions in all individuals.

Reactions of normal tissues to irradiation may be divided in several ways: as immediate or late; or with reference to the particular tissue or tissues affected; or according to whether the reaction is of mild or severe degree. The latter depends largely upon the volume of tissue irradiated and the dose; the greater the volume of tissue exposed and the greater the dose, the more severe is the reaction likely to be. Reactions also depend upon the character of the tissue irradiated: i.e., whether it is bowel, bladder, spleen, liver, lung, or a combination of different organs. Some of the tissues are much more susceptible than are others.

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The reactions with which we are concerned in this report are those incurred during radium and roentgen treatment of the pelvis in cases of cervical cancer. For this condition, radium application is usually confined to the uterine canal and upper vagina. The sphere of its activity is comparatively limited; yet, in addition to the uterus and cervix proper and the upper vagina, the bladder and rectum may be affected, as may even the small bowel if it happens to be adherent to the uterus. However, the *volume* of tissue affected is small so that significant primary reaction to radium irradiation is rare. The local reaction, true, may be intense. Roentgen therapy for cervical cancer is usually delivered through relatively large skin fields, usually two anterior and two posterior, approximately 10 by 15 cm. each. Occasionally, lateral fields, over the hips are employed, and still less frequently, only two large fields are used, one to cover the lower abdomen anteriorly and one to cover the back. All of these techniques necessitate the passage of the x-rays through large epithelial surfaces, large volumes of muscle and supporting connective tissues and fasciae, some portions of both small and large bowel, and bone. A certain amount of this is inevitable if the x-rays are to reach the tissues at which they are aimed, i.e., the parametria and the regional pelvic lymph nodes. With the combination of the two sources of irradiation, then, there are many possibilities for harm. Indeed, there have been enough very distressing and not infrequently fatal complications in our series of cases to warrant analysis. It seems no triumph to us to cure the cancer at the expense of making a "radiation cripple" of the patient. We feel certain that a comparable situation must exist wherever similar techniques have been employed.[3, 4, 5, 7, 11, 12]

Before going on to the actual analysis, a brief discussion of the specific reactions will help to clarify the problem. Immediate reactions have to do with the cytolytic effects of radiation and the alterations in body metabolism which result from breakdown products; or they are related to the lighting up of infection as a result of the radiation procedures.[2, 4] Since *radium* irradiation affects a relatively small volume of tissue, general effects are comparatively rare and usually insignificant. In a small proportion of cases nausea may be experienced. Not infrequently there is a febrile reaction, sometimes incident to the packing with transitory occlusion of drainage and sometimes due to infection. The actual placing of radium in these patients often involves strenuous manipulation of a seminecrotic, infected cervix so that infection may be spread to the adjacent parametrium and lymphatics. Occasionally, serious generalized infection results. It is doubtful if irradiation per se lights up infection; it may be that the manipulations incident to the placement of radium cause the trouble. On the other hand, *roentgen* therapy affects a large volume of tissue so that immediate general effects are more common. This is associated with considerable dermatitis, dermatolysis, and mucositis involving the epithelium of both bowel and bladder.[1, 10] "Radiation sickness,"[3] which may occur even before destructive tissue effects can take place, is sometimes seen. Its true nature is unknown. However, the composite result of the "radiation sickness" and the cytolytic effects may be anorexia, nausea, vomiting, often diarrhea, urgency and frequency of urination, and a certain amount of prostration. Occasionally a patient is "overwhelmed" and dies.

The *late* tissue effects of radiation have to do principally with changes in the connective tissues; these are chiefly proliferative.[2] This involves thickening of blood vessel walls with narrowing of vessel lumina, and thus diminution in

blood supply. This in turn may lead to radionecrosis. Examples of this type of reaction are a persistent central necrosis of the cervix (without cancer) with its attendant inflammatory concomitants; ulceration of bowel or bladder walls,[5] often with subsequent persistent hemorrhage from bladder or rectum (inelastic arterioles); rarefaction of bone, even fractures[6, 8]; or occasional perforation of a viscus,[7] sometimes with subsequent peritonitis, sometimes with fistula formation. There may, of course, be longtime specific effects upon tissues which prevent their repair other than diminution in blood supply, but in all probability the latter is the most important.

Other undesirable late effects have to do with the building up of connective tissue masses, or constricting scar tissue condensations; these reactions not infrequently cause partial or even complete bowel obstruction. Fibrosis of muscles sometimes interferes with certain motions. A striking though relatively harmless manifestation of this type of reaction is often to be found in the abdominal wall through which the roentgen rays have passed.[10] It may become 2 to 3 times its former thickness and very dense, fibrous, and unyielding. The overlying skin is likely to be thin and telangiectatic.

No doubt, infection often contributes to the heavy condensations of connective tissue in the parametrial and uterosacral ligaments, so that it is really impossible to resolve completely the various tissue reactions according to their various etiologic components. It is also often very difficult, if not impossible, to distinguish between irradiation fibrosis and cancerous infiltration upon ordinary pelvic examination.

Radiation Technique

Since 1931, a relatively standardized technique has been employed at the University of California Hospital. Most patients have received deep x-ray therapy first. Both 200 kv. (constant potential) and 1,000 kv. machines have been used. The factors have been as follows: The 200 kv. radiations were from a General Electric X-P tube activated by a constant potential apparatus at 200 kv. and 15 Ma., and filtered through the wall of the tube (0.2 mm. Cu. equivalent) and 0.2 mm. Sn., 0.25 mm. Cu. and 2 mm. Al.. or 0.5 mm Cu. plus 1 mm. Al. Supervoltage radiations were from the Sloan high frequency generator, operated at from 600 to 1,200 kv. and filtered through the tube wall of 1.5 mm. Cu. plus 3 mm. steel, and then through 2 mm. Pb., 1 mm. Cu., and 1.5 mm. Al. The skin target distance used is 80 cm.

During the 14 years, 1930 to 1945, under review, the roentgen dose has been gradually increased[9] so that for the last 4 to 5 years about 3,000 r. (measured in air) has been delivered to each of four fields (10 by 15 cm.), two anterior and two posterior. In this study, no patient is considered to have received deep therapy who has received less than 1,000 r. to each of four pelvic fields. Generally three weeks have been allowed for recovery after the termination of x-ray therapy before the insertion of radium. The first radium treatment has usually consisted of an intrauterine tandem of three 50 mg. capsules of radium for 3,000 mg. hr. (Screening: platinum 0.5 mm., rubber 2.0 mm.) The second treatment has usually been given two weeks later and has consisted of a plaque containing 100 to 150 mg. placed against the cervix for 1,500 mg. hr. (Screening: platinum 0.5 mm., brass 1.0 mm.) This dose has been increased or decreased according to circumstances. There have also been selected groups of patients who have received roentgen therapy alone (Stage IV cases), or radium alone (growth of small volume, particularly in elderly women). The entire study includes 621 patients with cancer of the cervix.

Immediate Reactions

Since the only significant immediate reactions to *radium* were those of a febrile character, only these are considered. Immediate reactions to radium classified as *severe:* development of a pelvic abscess (such abscesses were com-

monly associated with cervical necrosis, sections of which frequently showed no viable cancer cells); acute pelvic inflammatory disease; acute pyelonephritis; pelvic thrombophlebitis; extensive pelvic peritonitis; severe radiation reaction of the rectum with ulceration. In most of these instances the temperature was rather markedly elevated. These severe immediate reactions were sometimes followed by prolonged illness or even death. For example: A patient developed a pelvic abscess which eroded into a major vessel causing death from hemorrhage. One patient developed a severe pelvic inflammatory disease which did not respond to therapy, and the patient eventually died of sepsis. Another patient developed colitis and diverticulitis; eventually one of the diverticuli ruptured. Still another patient had a severe rectal reaction with bloody diarrhea; eventually she developed proctitis and a rectal stricture with partial obstruction. Under *moderate* immediate reactions have been included: instances of parametritis, cystitis, pyelonephritis, proctitis, peritonitis, enteritis, colitis, and cervical necrosis associated with fever of moderate degree, e.g., temperature of 37.5° C. to 38° C. for two consecutive days, excluding the first postoperative day, and often involving a prolonged hospital stay with low-grade fever. Whenever the febrile reaction was slight or did not appear at all, the reaction was classified as *mild*.

Of the 580 patients who received radium therapy either alone or in combination with x-ray 2.6 per cent had severe reactions, 6.9 per cent moderate reactions, and 90.5 per cent mild reactions. Table I represents an attempt to correlate the degree of immediate reaction to radium with the dose given. Interestingly, no significant differences could be determined when the dose was considered in this manner nor was a difference noted when the group which received radium alone was compared with the group which received both radium and x-ray therapy. (However, at times, radium therapy was stopped temporarily or reduced because of severe reaction. This would increase the number of severe reactions with lower doses of radium in this table.)

TABLE I. RADIUM THERAPY: REACTIONS

DOSE	NUMBER OF PATIENTS	SEVERE		MODERATE		MILD AND NONE
		NO.	PER CENT	NO.	PER CENT	
Less than 4,000 mg.hr. radium alone	85	3	3.5	6	7	76
More than 4,000 mg.hr. radium alone	90	3	3.3	8	8.8	79
Less than 4,000 mg.hr. with x-ray	113	5	4.4	6	5.3	102
More than 4,000 mg.hr. with x-ray	292	4	1.3	20	6.8	268
X-ray alone	41		--		--	--
Total	621	15	2.6	40	6.9	525 (90.5%)

In 126 cases, radium treatment was carried out in the face of low-grade fever (in excess of 37.4° C.) and/or a rapid sedimentation rate (30 minutes or less); 19, or 15 per cent, of these patients developed febrile reactions classifiable as severe or moderate. However, radium treatment was usually postponed in cases in which a temperature elevation existed.

With regard to the patients who received deep x-ray therapy either alone or in addition to radium, see Table II. Immediate reactions to radium have just been discussed. Immediate reactions to x-radiation were classified as *severe* when the patients were so prostrated or overwhelmed by the therapy that death ensued within a few days, or weeks, or a month or two at most; when nausea, vomiting, and diarrhea were so severe that considerable hospitalization was required; and when the patients were so sick that marked weight loss

occurred. Whenever the skin reactions were so marked that skin grafts proved necessary the reaction was also considered severe. Under *moderate* reactions have been included: severe skin reactions which did not require skin grafts and which were not associated with severe generalized reactions; reactions in which diarrhea, nausea, vomiting, anorexia, and prostration were sufficiently marked to make the patients quite ill, but not to a degree demanding hospitalization. Whenever the diarrhea, nausea, vomiting, anorexia, and weight loss caused little disturbance, or failed to appear at all, the reaction was classified as *mild*. Of the 409 patients who received deep x-ray therapy either alone or in combination with radium, 10 per cent had severe reactions, 30 per cent moderate reactions, and 60 per cent mild reactions. In Table II an attempt is made to correlate the degree of immediate reaction to x-radiation with the amount of radiation given. Curiously enough, no significant differences could be determined when the figures were handled in this way. (However, at times, therapy was stopped temporarily or abbreviated because of severe reaction. This would increase the number of severe reactions with lower doses of x-ray in this table.)

TABLE II. REACTIONS TO X-RAY THERAPY

DOSE	SEVERE		MODERATE		MILD		TOTAL
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	
Less than 1,500 r. × 4F	7	15	11	24	28	61	46
More than 1,000 r. × 4F Less than 2,000 r. × 4F	19	11	41	24	106	65	166
More than 1,500 r. × 4F More than 3,000 r. × 4F	14	7	70	35	113	58	197
Totals	40	10	122	30	247	60	Total 409

In Table III, the cases were rearranged in order that a comparison might be made between the immediate reactions in patients treated with the 1,000 kv. machine and those treated with 200 kv. x-rays. The incidence of severe and moderate reactions was only slightly higher for those treated with the 1,000 kv. machine.

TABLE III

MACHINE	PATIENTS	SEVERE		MODERATE		MILD	
		NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
1,000 kv	243	36	15	33	30	174	55
200 kv	99	11	11	21	21	67	67

Part of the difference between the 1,000 kv. machine and the 200 kv. must be attributed to the fact that the 1,000 kv. machine has been used more recently when larger doses of x-ray have been given. It is the general feeling of many radiologists that the 1,000 kv. machine enables one to deliver a larger dose to the pelvis with less skin reaction, particularly in those with very thick abdominal walls.[10]

Eighty-eight patients were treated through six fields, which included two lateral ports in addition to the usual four pelvic ports. In this group, severe and moderate immediate reactions occurred in 15 per cent and 34 per cent, respectively, figures not significantly different from those for the four-field technique. In some instances the immediate reaction to irradiation was so severe that death ensued shortly after. These cases are discussed later in a section on mortality.

Late Reactions

Late reactions to irradiation were considered to be those which developed after the patient presumably had recovered from the immediate effects of therapy. It must be realized that a single reaction may be represented in two places in these statistics, e.g., a bowel obstruction also may be a connective tissue reaction when it is due to radiation. It will be noted that most late reactions can be explained, in great part, on the basis of the proliferative effect of radiation upon connective tissue, giving rise to obstructions or to markedly diminished blood supply. Some late reactions were due to the consequences of inflammation.

Bowel Obstructions

In this series there were 38 bowel obstructions which, in our judgment, were not due to cancer; ten of these obstructions were severe enough to necessitate colostomy. There certainly were many more partial obstructions, such as those of the rectum, which did not produce enough symptoms to be of note or to cause them to be listed here. Most of the obstructions were located in the neighborhood of the rectosigmoid junction opposite the cervix. This is not surprising when we consider that this section of bowel must receive the largest combined effect of radium and x-ray. Table IV confirms the impression that dose was a large factor here since it showed that the incidence of obstruction increased as the amount of irradiation was increased by the addition of larger and larger amounts of x-ray to radium therapy.

TABLE IV

TYPE OF THERAPY	PATIENTS	OBSTRUCTION	PER CENT
X-ray alone	41	0	0
Less than 4,000 mg.hr. radium alone	85	0	0
More than 4,000 mg.hr. radium alone	90	4	4
Less than 1,500 r. × 4F plus radium	24	0	0
Less than 3,000 r. × 4F more than 1,500 r. plus radium	166	9	5
More than 3,000 r. × 4F plus radium	215	25	12
Total	621	38	6.1

The table also shows that obstruction did not occur in the small group of cases in which x-radiation alone was used, but the addition of x-ray in larger doses to radium therapy significantly increased the number of obstructions.

Connective Tissue Reactions

Condensations of tissue which were significant enough to cause signs or symptoms and which were apparently the result of irradiation changes in the vessels are considered under the heading of connective tissue reactions. In this group, we have also placed reactions in which there was a proliferation of connective tissue under radiation stimulus to such a degree that significant symptoms resulted. Included, then, are such difficulties as bowel or ureteral obstructions, lymphatic obstructions, etc. There were 46 such reactions (Table V).

The table shows that the "connective tissue" reactions were more common after larger doses of irradiation, especially when radium was used also.

TABLE V

TYPE OF THERAPY	PATIENTS	CONNECTIVE TISSUE REACTIONS	PER CENT
X-ray alone Less than 3,000 r. × 4F	30	0	0
X-ray alone More than 3,000 r. × 4F	11	1	9
Less than 4,000 mg.hr. of radium alone	85	0	0
More than 4,000 mg.hr. of radium alone	90	5	5.5
Less than 1,500 r. × 4F plus radium	24	1	4.1
Less than 3,000 r. × 4F More than 1,500 r. plus radium	166	10	6
More than 3,000 r. × 4F plus radium	215	29	13.5
Total	621	46	7.4

Colitis, Proctitis, Rectal Bleeding

Commonly, late complaints were associated with the bowel, and here patients who had either marked colitis, proctitis, or rectal bleeding are grouped together. Again, it is to be remembered that there were many patients who suffered from mild degrees of these complaints who are not considered here (Table VI).

TABLE VI

TYPE OF THERAPY	PATIENTS	COLITIS, PROCTITIS RECTAL BLEEDING	PER CENT
X-ray alone	41	3	7.3
Less than 4,000 mg.hr. radium alone	85	1	1.1
More than 4,000 mg.hr. radium alone	90	2	2.2
Less than 1,500 r. × 4F plus radium	24	1	4.1
Less than 3,000 r. × 4F more than 1,500 r. plus radium	166	18	10.8
More than 3,000 r. × 4F plus radium	215	51	23.7
Total	621	76	12.2

This table shows an increase in the numbers of intestinal reactions when x-ray in larger doses was added to radium treatment.

Bowel Ulcers

Isolated bowel ulcers, apparently due to local necrosis of mucosa from irradiation, occurred in ten cases. There were none of these among the 175 patients treated with radium alone and none among 99 patients treated with x-ray and less than 4,000 mg. hr. of radium. However, all ten occurred among 273 patients who were treated with more than 4,000 mg. hr. of radium combined with x-ray in excess of 1,500 r. to four fields. Most of these bowel ulcers, as might be expected, occurred high in the rectum or in the region of the recto-sigmoid junction, areas which received a large sum of irradiation from the two sources.

Urologic Complications

The urinary bladder was frequently involved in late reactions to irradiation. In this series are included those patients whose cystitis was apparently due to irradiation as revealed, in the greatest number of patients, by cystoscopic exami-

nation. The group also includes patients who had bladder bleeding of significant enough degree to warrant treatment. There were 48 patients in this group. They are reviewed in Table VII.

TABLE VII

TYPE OF THERAPY	PATIENTS	BLADDER REACTIONS	PER CENT
X-ray alone	41	1	2.4
Less than 4,000 mg.hr. radium alone	85	2	2.3
More than 4,000 mg.hr. radium alone	90	9	10.0
Less than 4,000 mg.hr. with x-ray	123	3	2.4
More than 4,000 mg.hr. with x-ray	282	33	11.7
Total	621	48	7.7

This table shows the relation of bladder reactions to larger doses of radium. Forty-two of the forty-eight bladder reactions occurred among the 374 patients who received more than 4,000 mg. hr. of radium.

Fractures

In this series there were five hip fractures and one fracture of the symphysis. There probably were other such fractures which were not recognized as such. In addition, there was a considerable number of patients who complained of pain in their hips and whose x-rays showed osteoporosis of the hip bones without evidence of fracture.

Fractures of the neck of the femur associated with roentgen therapy have been described by others.[6, 8] There is agreement that they are due to endarteritis which in turn leads to osteoporosis and increased fragility. X-ray pictures at the time and subsequent events have usually proved these fractures not to be due to metastases.

Three of the five hip fractures occurred among eighty-eight patients who received six-field therapy (i.e., which included two lateral portals). The other two patients who developed hip fractures received 3,400 r. to four fields and 2,750 r. to four fields respectively. All five received radium therapy.

The patient with the fractured symphysis received 6,274 mg. hr. of radium plus 2,500 r. to one anterior and one posterior field.

The hip fractures, then, were associated with high doses of x-ray and were more common with six-field therapy. As one might expect, no fractures occurred among the patients who were treated with radium alone, since the action of radium placed in and about the cervix could hardly include tissues as far removed as the bony walls of the pelvis.

Muscle Reactions

A number of the patients in this series suffered from rather severe late "muscle reactions" as indicated by difficulty in moving extremities, inability to stand erect, etc. Such difficulties were thought to be due to fibrosis in the muscles and to decreased vascularity. It is certain that many of the patients in the series have had muscle reactions of a milder degree than is considered here. There were fifteen "muscle reactions" noted to be of considerable degree. Eleven of these were found among the patients who received more than 3,000 r. to four fields with radium and all fifteen received more than 1,500 r. with radium. Eight of the fifteen occurred among the eighty-eight patients who received six-field therapy.

Thus, the severe muscle reactions were associated exclusively with patients who had received x-ray therapy, especially those who had received the larger doses of six-field therapy.

Fistulas

There were sixteen fistulas which seemed to be the result of irradiation changes, i.e., loss of vascularity with consequent necrosis. Of these, seven were rectovaginal, four were vesicovaginal, and five were in miscellaneous locations including an enterovaginal fistula. These figures represent an incidence of 2.5 per cent.

The association with type of therapy is summarized in Table VIII.

TABLE VIII

TYPE OF THERAPY	PATIENTS	FISTULAS	PER CENT
X-ray alone	41	0	0
Less than 4,000 mg.hr. radium alone	85	1	1.1
More than 4,000 mg.hr. radium alone	90	0	0
Less than 1,500 r. × 4F plus radium	24	1	4.1
Less than 3,000 r. × 4F more than 1,500 r. plus radium	166	6	3.6
More than 3,000 r. × 4F plus radium	215	8	3.4
Total	621	16	2.5

The fistulas were found, then, among the patients who received a combination of x-ray therapy and radium. Apparently factors other than dose must have operated since an increased incidence of fistula was not clearly associated with larger doses. (Variations in technique not discernible in our analysis may have been responsible). The figure given here may be high since on some occasions it was difficult to be sure that the fistula was due to irradiation and not to cancer.

Radiation Necrosis

Almost complete noncancerous necrosis of the cervix followed by severe hemorrhage or abscess formation occurred in at least five patients, one of whom was treated with radium alone, the others having been given average doses of radium and x-ray in combination. Interestingly, at postmortem examination, such patients showed no viable cancer cells or else such examination revealed malignant cells which were apparently greatly damaged.

1,000 Kv. and 200 Kv. Machines

The 1,000 kv. machine and the 200 kv. machine were compared in the review with respect to each of the reactions noted. In most instances there were no significant differences. However, some difference in result was noted in the review of bladder reactions. Two hundred forty-three patients were treated with unmixed 1,000 kv. irradiation and 99 patients were treated with unmixed 200 kv. irradiation.

MACHINE	PATIENTS	BLADDER REACTIONS	PER CENT
1,000 kv.	243	28	11.5
200 kv.	99	3	3.0

The slightly higher incidence of bladder reactions in cases in which 1,000 kv. x-radiations were employed is difficult to explain and may well be due to chance—we are not inclined to attach any particular importance to it.

Mortality

Nineteen patients died as a consequence of irradiation (Table IX), and two others probably died of the effects of radiation. While all of these deaths were not due directly to the rays of radium and/or x-ray, there were several deaths attributable to such action since at autopsy or surgery nothing was found except the extreme destruction of cancer cells. In the remainder of the patients, the radiation apparently caused enough changes to precipitate death which took place in a few days to a few months following completion of treatment. No death was included in this group in which it appeared reasonable that cancer alone might have been the responsible factor. Probably there were other deaths, hastened by irradiation which have not been included.

In this series, 621 patients have been considered. Fifty of these patients received surgery as a major portion of their therapy, and therefore, they received irradiation primarily to clear infection and usually in small amounts. The 21 deaths considered here occurred among the other 571 patients, which gives a mortality rate of 3.7 per cent.

TABLE IX.—MORTALITY

CAUSE OF DEATH	RADIUM	X-RAY
1. Pyeloureteritis with uremia	5,200 mg.hr.	1,700 r. 4F
2. Hemorrhage (immediately after x-ray)	1,547	1,600 r. 4F
3. Perforation of sigmoid after acute peritonitis	3,027	1,520 r. 4F
4. Pelvic abscess	2,680	1,760 r. 4F
5. Pelvic abscess	2,233	0
6. Perforation with generalized peritonitis	4,558	3,160 r. 4F
7. Acute peritonitis	0	3,476 r. 2F
8. Severe immediate reaction with prostration	4,732	2,500 r. 4F
9. Severe immediate reaction with prostration	0	3,000 r. 2F
10. Severe immediate reaction with prostration	0	3,500 r. 2F 1,800 r. Lat. F
11. Severe immediate reaction with prostration (probable)	4,059	3,700 r. 4F
12. Abscess drain to peritoneum	6,344	3,000 r. 4F
13. Pelvic abscess with peritonitis	4,500	3,000 r. 4F
14. Perforation with cul-de-sac abscess	5,000	3,000 r. 4F
15. Cul-de-sac abscess	3,375	3,050 r. 4F
16. Severe immediate reaction with prostration	3,800	3,300 r. 4F
17. Severe colitis (probable)	5,000	3,550 r. 4F
18. Intestinal obstruction	4,500	4,050 r. 4F
19. Pyelonephritis, hydronephrosis, prostration	3,000	3,100 r. 6F
20. Perforation with peritonitis	4,500	3,550 r. 4F
21. Ileocolic fistula, prostration	4,000	3,850 r. 4F

In summarizing the death causes then:

Pyelonephritis, uremia, etc.	2
Hemorrhage	1
Pelvic abscess, plus or minus peritonitis	5
Bowel perforation	4
Peritonitis	1
Prostration	6
Obstruction	1
Ileocolic fistula	1

The chief causes of death were prostration during or immediately following roentgen irradiation (6 cases); the end results of infection, probably initiated at the time of radium application, or at least aggravated by this procedure (5 cases); and bowel perforation (4 cases). It should probably be possible to avoid "prostration" by more careful attention to the patient during her therapy with prompt interruption if her general condition appears to be deteriorating abnormally. Possibly smaller doses over longer periods of time could be used in the more sensitive individuals. It should also be possible to reduce the number of deaths due to infections by more careful preparation of the patient before

radium treatment, and constant attention to the avoidance of undue manipulation and injury of the cervix during biopsy, examination, and radium insertion. Penicillin and the sulfonamides have been used extensively without appreciable result.

Irradiation necrosis is probably responsible for bowel perforation. Complete prevention is unlikely to be achieved if we are to provide sufficient irradiation to be effective.

Discussion

It is apparent that radiation therapy for cervical cancer, when provided by the technique employed at the University of California Hospital, carries with it a distinct morbidity and mortality. Indeed, these complications have been sufficiently prevalent and distressing to stimulate us to seek ways and means of avoiding them. While we doubt that complications can be completely eliminated as long as radiation in effective doses is employed, we do feel that searching analysis of present methods and results can lead us to some improvements. In general, the severity of reactions increased as the dose increased, though this was not particularly convincing with regard to immediate reactions in our series of cases. This principle was borne out quite clearly with regard to late reactions.

Radium alone, as pointed out earlier, produced little significant general reaction, but its use, either directly or indirectly, sometimes caused the induction or exacerbation of infection, which occasionally was serious enough to cause death. Local destruction of tissue, fistula formation, etc., were not common in our cases from radium alone. Roentgen therapy often caused a general reaction, and sometimes produced so much prostration and general metabolic disturbance that death followed. It also produced proliferative changes in the normal connective tissue structures, not infrequently to such an extent that obstructions resulted, or necrosis ensued due to endarteritic changes with consequent reduction in the vascularity of the tissues. The incidence of complications was definitely greater in cases in which both radium and x-ray were used, and also increased as dose increased. Undoubtedly overradiation, particularly of the cervix and immediately surrounding tissues, was often present. We believe that where x-radiation of effective proportions is added to an established radium technique—and in general this is the evolution of the treatment of this disease during the last fifteen years—thought should be directed toward reducing the irradiation to the tissues within the effective range of the radium, lest these tissues receive a lethal dose from the combined sources.

TABLE X

RADIUM MG.HR.	X-RAY × 4F	PATIENTS WITHOUT SURGERY	ALIVE 5 YEARS	PER CENT
Less than 4,000	0	46	6	13
More than 4,000	0	70	20	29
Less than 4,000	Less than 3,000 r.	43	10	23
Less than 4,000	More than 3,000 r.	34	11	32
More than 4,000	Less than 3,000 r.	128	46	36
More than 4,000	More than 3,000 r.	115	47	41
	Total	436	140	

Statistics for the 436 patients in this series who were treated radiologically only, more than five years ago, show that the percentage of survivals increased

as the dose of radium and x-radiation increased (Table X). Possibly even larger doses would result in a still larger number of survivors, yet certainly a point would be reached where the increasing number of radiation complications would more than cancel the advantages.

A number of factors have been considered in connection with our search for means of reducing the incidence and severity of irradiation complications. There were 42 patients who had a significant anemia (hemoglobin less than 60 per cent) at the onset of therapy; 9 of these survived for more than 5 years. This is a lower survival rate than that of the whole series, but the number of cases is too small to be convincing. There were 92 patients who had fever (37.4° C. or more) and/or a rapid sedimentation time (18 mm. in 30 minutes or less) before irradiation. Only twelve of this group survived the five-year period. While such factors as fever and anemia appear to be related to a poor prognosis, they may well have been incidental only, since anemia and infection are more likely to be present in the more advanced cases. However, it would seem worth while to make every effort to combat anemia and infection before treatment is instituted whenever possible.

The increased incidence of late complications in and about the cervix (necrosis, obstructions of the rectosigmoid, etc.) in cases in which radium and x-ray were combined, particularly in the larger doses, suggests that these tissues were sometimes overradiated. We believe that a reduction in dose is in order. Factors such as screening, intensity, duration of treatment, interval between treatments, etc, may well play a part in this connection.

Efforts should also be continued to determine the radiosensitivity of tumors since reduced amounts might frequently be in order. Indeed, this can sometimes be arranged on the basis of clinical response, although obviously it would be unwise to place too much reliance upon such an evaluation. Studies of serial biopsies or vaginal smears during the course of treatment might possibly prove more reliable.

Other measures which deserve further investigation or trial are the antibiotics (disappointing so far), the role of palliative surgery in cases of irradionecrosis without recurrence, continuous hospitalization during roentgen radiation therapy, the determination of isodose curves for the method of treatment in use so that overradiation can be avoided on a more precise mathematical plan.

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VASCULAR CONGESTION AND HYPEREMIA*

Their Effect on Function and Structure in the Female Reproductive Organs

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PART II. THE CLINICAL ASPECTS OF THE CONGESTION-FIBROSIS SYNDROME

THE theoretical considerations and the analysis of past contributions in the literature have indicated that many gynecologic symptoms and some organic lesions may be based on a primary vascular congestion leading to fibrosis in the organs of the reproductive tract. With these possibilities in mind, a series of 105 cases has been studied in order to outline the clinical characteristics and to determine the possible scope of the disorder.

Clinical Material for Study

The 105 patients of the series were all interviewed, examined, and followed by the writer. Eighty-two of these were private patients, the remainder being cases seen in the wards or clinics of one of several New York hospitals. These cases were gradually accumulated over the last decade, the group being added to more rapidly in recent years, when the characteristics of the disorder had become clearer.

The patients of the report represent only the more severe and clearly defined examples of the disorder. If all the patients with symptoms possibly attributable to pelvic congestion had been added, the series would have been many times as large, including numerous cases with otherwise unexplained pelvic pain, dysmenorrhea, mucous leucorrhea and menorrhagia. Fränkel,[16, 17] writing of chronic parametritis, stated that one-half of all gynecologic patients suffered from some degree of this disorder and in 10 per cent it was the chief source of symptoms. Assuming that chronic posterior parametritis may properly be identified with chronic pelvic congestion, Fränkel's estimate appears to be a not unreasonable one.

To give a general idea of the range of symptoms for which the patients with pelvic congestion primarily sought relief, Table I is presented. Minor examples of such complaints form a considerable part of office gynecologic practice.

The concept as outlined in Part I suggests that congestion as it is seen in breast, ovaries, uterus, and parametria is a similar condition and that it tends to occur simultaneously in the same patient in more than one of these sites. The cases to be reported here, however, are all examples primarily of pelvic congestion. In a group of cases previously reported (Taylor[41, 42, 43]) breast engorgement was the starting point and other signs or symptoms in the reproductive tract were related to it as associated conditions. In this study the focus is on the pelvis and the identifying sign has been the characteristic tenderness of the parametrium, observable on gynecologic examination, in the absence of any evidence of pelvic inflammatory disease.

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TABLE I. PRESENTING SYMPTOM OR CLINICAL CHARACTERISTIC OF EACH CASE

	NO. OF CASES
Diffuse suprapubic pain	42
Painful "cystic" ovaries	17
"Congestive" dysmenorrhea	11
Menorrhagia	9
Sterility	7
Lower back pain	6
Breast engorgement	4
Leucorrhea	3
Premenstrual tension	2
Dysuria	1
Dyspareunia	1
Coccydynia	1
Vaginal pain	1
Total cases	105

The order used in the presentation of the material in this section was determined upon to serve the primary need of establishing this disease as an entity and to delineate its clinical features. The following headings will therefore be used:

A. The age and marital status of the patients.

B. Symptoms, signs, and gross pathologic change noted in each of the organs particularly involved:
   a. Parametrium
   b. Cervix
   c. Uterus
   d. Adnexa
   e. Peritoneum
   f. Vulva
   g. Other Pelvic Organs
   h. Breasts

C. The effects on fertility and reproduction.

D. General associated autonomic nervous system symptoms.

A. The Age and Marital Status of the Patients

The ages of these patients were all, with one exception, in the years of ovarian function (Table II). The majority of patients were in the twenties or thirties, the decades of most sexual activity. The one patient who had passed her menopause dated the onset of her symptoms from a much earlier period of her life.

TABLE II. AGE DISTRIBUTION

AGES BY DECADES	15-19	20-29	30-39	40-49	50-	TOTAL
Number of cases	1	56	39	8	1	105

TABLE III. REPRODUCTIVE AND MARITAL STATUS

	CHILDREN ONLY	CHILDREN AND ABORTIONS	ABORTIONS ONLY	NO CHILDREN	TOTAL
Single women	0	1	1	14	16
Married women	26	17	12	23	78
Divorced, separated, or widowed	2	1	4	4	11
Total	28	19	17	41	105

About three-fourths of all the patients were married women, but sixteen were single and eleven divorced, widowed, or separated. The reproductive history (Table III) showed that less than half of the group, forty-seven, had borne children, although of the remainder seventeen had had abortions. The low fertility and the apparently high abortion rate of the group will be referred to again.

B. Symptoms, Signs, and Gross Pathologic Findings

Certain signs and symptoms will be ascribed in this section to particular portions of the genital tract, a method of presentation which seems necessary in order to relate the various clinical symptoms and signs to their probable sources.

1. *The Uterus.*—

The full possibilities of vascular disorder as a cause of uterine symptoms are not covered by this report. Several of the French writers, notably Faure and Siredey,[11] speak of two types of uterine congestion, "congestion sèche," characterized by exaggeration of the menstrual syndrome without increased loss of blood, and "la forme ménorragique," characterized by excessive periods. While it seems highly probable that many cases of painless menorrhagia have a vascular factor in their causation, it is essentially the first type of the French authors that is here considered. In this group pain of some type is the prominent symptom, while changes in menstrual bleeding, though fairly frequent, are not usually the principal problem.

Menstrual Periods: The type of menstrual periods reported by these patients as being characteristic for them before the onset of their present illness is shown in Table IV. The distribution of cases with regard to duration of cycle, length and amount of flow, and degree of discomfort seems about that to be expected in any such group of women of these ages. No evidence of predisposition to endocrine or vascular disorder was evident, therefore, in an analysis of the characteristics of the original menstruation.

TABLE IV. CHARACTERISTICS OF ORIGINAL MENSTRUATION

CYCLE OF PERIODS	Normal 25 to 34 days 90	Long 35 days or more 10	Short 24 days or less 5
DURATION OF FLOW	Normal 3 to 7 days 93	Short 2 days or less 5	Long 8 days or more 7
AMOUNT OF FLOW	Normal 93	Scant 5	Heavy 7
PAIN	None 42	Slight 30	Moderate or severe 33

TABLE V. ALTERATIONS IN CHARACTERISTICS OF MENSTRUATION

CYCLE OF PERIODS	No change in cycle 80	Cycle becoming longer 9	Cycle becoming shorter 13	Cycle becoming irregular 3
DURATION OF FLOW	No change in duration 67	Duration shorter 21	Duration longer 17	
AMOUNT OF FLOW	No change in amount 60	Flow decreasing 26	Flow increasing 19	
PAIN	No change 37	Pain decreasing 6	Pain appearing for first time 27	Pain increasing 35

Menstrual Change: With the beginning and progress of their illness many of these women noted change in the frequency, duration, or amount of flow (Table V). No type of change was characteristic. It is noteworthy, however, that excessive flow was not often a major problem and decrease in amount or duration of flow was often reported. This affords an interesting parallel to the observations made by so many writers that scant menstruation is common in women with painful types of "chronic mastitis" (Taylor[41, 42, 43]).

Menstrual Pain: Increased discomfort was the most frequent menstrual symptom (Table V). An exacerbation or the first appearance of pain was noted in sixty-two patients (59.0 per cent).

This pain, as it is in the breast, is not menstrual but characteristically premenstrual in its time of appearance. In some cases it is simply an exaggeration of the constant suprapubic and back pain experienced throughout the cycle. In others these symptoms appear a few days to a week before the onset of the period and are usually considerably relieved by the onset of bleeding. In a few, however, the somewhat diffuse premenstrual symptoms are aggravated at the onset of the flow by more localized cramps. The entire pattern of this "secondary" dysmenorrhea is, however, distinct from the "primary" dysmenorrhea of normal young women.

The dysmenorrhea of this disorder has been described by a large number of the writers on chronic parametritis and on chronic pelvic congestion, regardless of their own exact etiologic or pathogenic theories.[11, 12, 21, 28, 30, 39] The premenstrual symptoms are almost certainly based upon the premenstrual swelling of already passively congested organs and the menstrual cramps upon the perception of contractions in a similarly excessively congested organ.[39, 40]

Intermenstrual Bleeding: Intermenstrual bleeding was reported by twenty-seven patients, or about a quarter of the series. The bleeding was usually slight in amount and not related to the probable time of ovulation. This symptom seems to be the result of minute hemorrhage from the excessively congested endometrium or endocervix and is not hormone conditioned "intracyclic bleeding." In the writer's opinion this is the commonest cause of intermenstrual "spotting," an important point, in this day when such a symptom immediately suggests malignancy to both layman and physician.

TABLE VI. CONDITIONS OF UTERUS NOTED ON PHYSICAL EXAMINATION

	SIZE			POSITION	
	NORMAL	ENLARGED	SMALL	NORMAL	RETROVERSION 2ND OR 3RD DEGREE
Patients having had children	23	24	0	27	20
Patients having had abortions only	13	3	1	13	4
Patients without pregnancies	34	5	2	31	10
Total	70	32	3	71	34

The Uterus on Physical Examination: The uterus was found by palpation to be enlarged in thirty-two instances (Table VI). Enlargement was more common in women who had had children, being in these instances perhaps the equivalent of what is sometimes termed "subinvolution."[7] Hypertrophy was, however, also noted in some patients who had never been pregnant.

Retroversion of possibly significant degree was noted in thirty-four cases, and nine additional cases (Table VII) had apparently had a previous uterine suspension. The relationship of malpositions of the uterus to pelvic congestion will be discussed with other etiologic considerations. Fibroids were noted on examination in five cases, an insignificant figure.

The Uterus When Observed at Operation in these cases offers certain striking aspects. Typically, it is enlarged, soft, deep purple in color, suggesting to the operator the possibility of an early pregnancy. Sometimes when such a uterus is lifted forward irregular contraction of the fundus occurs, giving it a somewhat mottled appearance. These characteristics were prominent in one-half of the eighteen patients operated upon after the diagnosis of pelvic congestion had been made (Table IX). Such enlargement of the congested uterus is referred to by most of the French writers but by others as well.[21, 31] Goodall and Power's[25] description of the uterus in "metrallergy" coincides closely with that of the congested uterus.

Endometrium was examined in seventeen cases of which nine were reported as "premenstrual" or "secretory" and eight as "normal" or "proliferative." In three, note was made of the abnormal number of leucocytes leading to a diagnosis of "chronic endometritis." The evidence here is thus against any major disturbance of ovarain physiology.

TABLE VII. OPERATIONS PREVIOUSLY PERFORMED

OPERATIONS ON THE OVARIES		11
Types of Ovarian Operation		
Right salpingo-oophorectomy	3	
Left salpingo-oophorectomy	3	
Unilateral salpingo-oophorectomy	1	
R. partial oophorectomy	1	
L. partial oophorectomy	1	
Bi. partial oophorectomy	1	
R. salpingo-oophorectomy; L. partial oophorectomy	1	
Additional Operations		
Hysteropexy	2	
Appendectomy	3	
Ligation of tubes	2	
OTHER ABDOMINAL GYN. OPERATIONS		11
Types of Operation		
Hysteropexy	7	
Hysteropexy and myomectomy	1	
Exploration for fibroid	1	
Plastic on tubes	1	
Exploration for "salpingitis"	1	
Additional Operations		
Ligation of tubes	1	
Salpingectomy	1	
Appendectomy	5	
PLASTIC OPERATIONS ON THE VAGINA		2
DILATATION AND CURETTAGE		7
with Appendectomy	2	
APPENDECTOMY ONLY		19
OTHER MAJOR OPERATIONS		4
with Appendectomy	4	
TOTAL PATIENTS WITH PREVIOUS GYNECOLOGICAL OPERATIONS		31
TOTAL PATIENTS WITH PREVIOUS OPERATIONS		54

TABLE VIII. OPERATIONS SUBSEQUENTLY PERFORMED

OPERATIONS ON THE OVARIES		11
Types of Ovarian Operation		
R. salpingo-oophorectomy	6	
L. salpingo-oophorectomy	2	
L. partial salpingo-oophorectomy	1	
Bilateral partial oophorectomy	2	
Additional Operations		
Hysteropexy	10	
Hysterotomy	1	
Myomectomy	2	
Cervical operations	4	
Dilatation and curettage	9	
OTHER ABDOMINAL OPERATIONS		7
Types of Abdominal Operations		
Hysteropexy	2	
Hysteropexy and myomectomy	3	
Complete hysterectomy	1	
Exploration only	1	
Additional Operations		
Cervical operations	2	
Appendectomy	3	
Dilatation and curettage	6	
Excision labium	1	
GYN OPERATIONS NOT INVOLVING PERITONEUM		5
Dilatation and curettage only	2	
Dilatation and curettage; cauterization of cervix	3	
TOTAL PATIENTS HAVING GYNECOLOGICAL OPERATIONS		23

TABLE IX. FINDINGS IN EIGHTEEN PATIENTS HAVING ABDOMINAL OPERATIONS UNDER OBSERVATION

PERITONEUM			OVARIES				TUBES		FUNDUS				CERVIX			
ADHESIONS	FREE FLUID	EDEMA	ENLARGED	FIBROSED	CYSTIC	EDEMATOUS	ADHESIONS	CONGESTED	ENLARGED	SOFTENED OR CONGESTED	RETROVERTED	FIBROID	ENDOCERVICITIS	EROSION	LACERATION	HYPERTROPHY
7	4	2	6	5	10	3	5	2	10	9	5	5	15	7	3	2

2. *The Parametrium.*—

The symptoms of congestion in the broad and uterosacral ligaments consist in various types of discomfort, suprapubic pain and tenderness, bearing down and weight sensations, backaches, and dyspareunia. These symptoms correspond with an extraordinary, even pathognomonic, tenderness of the parametrial tissues evident on pelvic examination.

TABLE X. TYPES OF INTERMENSTRUAL PAIN

TOTAL WITH PAIN	SUPRAPUBIC BILATERAL	SUPRAPUBIC RIGHT	SUPRAPUBIC LEFT	BACKACHE	ACUTE ATTACKS	DYSPAREUNIA
98	50	35	8	57	23	49

Intermenstrual Pain (Table X): Suprapubic pain with tenderness, present in ninety-three cases, was apparently a reflection of the general pelvic conges-

tion. This symptom has been described by almost all writers on pelvic congestion and on "chronic parametritis."

Backache, characteristically sacral in position and made worse by standing and the approaching menstrual period, was complained of by fifty-seven patients. This is apparently the result of the swollen uterosacral ligaments, and is a symptom constantly described.[21, 27, 28, 31, 38, 39, 44]

Painful Intercourse is one of the consistent symptoms of the syndrome. It was present in forty-nine of the sixty-three married women on whom data on this point were available. This symptom is noted by most of the modern French writers, but also by many others.[20, 21, 27, 28, 33, 39, 44] Kehrer[30, 31] lays special stress upon the symptom, which he makes the central point of this whole entity. The dyspareunia is apparently the direct result of the tenderness in the ligaments attached to the uterus and cervix.

The Parametrium on Physical Examination: The single most characteristic sign of pelvic congestion is the tenderness in the uterosacral ligaments. It is elicited, as Fränkel,[16] Kehrer,[31] Young,[44] and others have described, by placing an examining finger high in the posterior fornix behind the cervix and attempting to lift the uterus gently forward. Sudden, intense pain is produced by this maneuver in any typical case of pelvic congestion. Tenderness in the parametrium was a definite sign in ninety-eight of the cases in the present series (Table XI), while absent or questionable in only seven.

TABLE XI. CONDITION OF PARAMETRIUM NOTED ON PHYSICAL EXAMINATION

	NORMAL	TENDERNESS	INDURATION
Women with children	2	45	2
Women with abortions only	0	17	3
Women with no pregnancies	5	36	2
Total	7	98	7

The recognition of the shortening, fixation, or induration of the broad ligaments, apparently sensed so vividly by the early German writers, was found very difficult. The records of these cases indicate the presence of such findings in only seven instances. Possibly these were a different group of cases from those described by Freund,[21] and Schultze.[39] More likely a different concept of the basis for the tenderness of the uterosacral ligaments has led to different clinical interpretations of the same physical findings.

3. *The Cervix.*—

Of the one hundred five patients of this series, seventy-eight gave leucorrhea as one of their presenting symptoms, an observation consistent with the descriptions of former writers on "pelvic congestion" and "chronic parametritis." The leucorrhea is usually mucopurulent in character. At times, however, the discharge, as observed, is an absolutely clear mucus, convincing evidence that it is due to a hypersecretion uncomplicated by infection.

The physical findings (Table XII) indicate some degree of "endocervicitis" in ninety cases, an erosion in forty-six, and an hypertrophy in eighteen. A history of previous cauterization of the cervix was frequently obtained. Of special interest was the extreme degree of hypertrophy in two women who had never borne children.

4. *The Ovaries.*—

The evidence for an involvement of the ovary in the process of pelvic congestion is based on the incidence of unilateral abdominal pain, the finding of tender ovaries on bimanual palpation and the observation of conditions found at operation.

TABLE XII. CONDITIONS OF CERVIX NOTED ON PHYSICAL EXAMINATION

	NORMAL	ENDO-CERVICITIS	EROSION	HYPER-TROPHY	LACERATION
Women with children	2	45	23	16	13
Women with abortions only	4	13	2	1	0
Women with no pregnancies	9	32	21	1	0
Total	15	90	46	18	13

Lateral Lower Abdominal Pain: In forty-three patients, unilateral lower abdominal pain was one of the chief complaints (Table IX). Contrary to most previous experience, the right side was the one most commonly affected. The pain from the congested ovary is characteristically variable in intensity, but once established tends to recur continually and persist perhaps for years. The pain tends to be worse after standing, with fatigue, under emotional strain and after intercourse.

Ovarian Findings on Physical Examination: Tenderness was noted in examination of the ovaries, in addition to that of the uterosacral ligaments, in eighty-four patients (Table XIII). This tenderness was usually bilateral, but when only one side was affected, the right was the commoner. Enlargement of one or both ovaries was thought to be present in forty-seven instances.

Ovarian symptoms had already been made the excuse for a number of abdominal operations at the time these patients were first seen. Table VII shows that in eleven of the series parts of one or both ovaries had already been removed. These operations were apparently all done for the treatment of the so-called "cystic ovary."

The Ovaries Observed at Operation (Table IX) were also usually found enlarged and described as "cystic" or "fibrosed." Sometimes and perhaps typically, the ovary was definitely swollen and edematous, with a tough white capsule and a cortex containing many small follicles and apparently an increase in tissue fluids.

TABLE XIII. CONDITIONS OF OVARIES ON PHYSICAL EXAMINATION

	TENDERNESS				ENLARGEMENT			
	NORMAL	RIGHT	LEFT	BILAT-ERAL	NORMAL	RIGHT	LEFT	BILAT-ERAL
Women with children	13	8	1	25	25	9	5	8
Women with abortions only	8	3	1	5	8	5	2	2
Women with no pregnancies	10	7	1	23	25	8	3	5
Total	31	18	3	53	58	22	10	15

A swollen, tender ovary causing protracted discomfort is, therefore, characteristic of pelvic congestion. The pain is apparently the result of a swelling of the ovary from edema and vascular engorgement within a tough, unyielding capsule. These observations are consistent with the view that long periods of congestion result in connective tissue hyperplasia in the ovarian cortex and interference with normal ovulation.

5. *The Peritoneum.*—

The peritoneum of the pelvis in extreme cases of this disorder may have a characteristic appearance. A striking observation seen in several cases was the presence of small pools of clear ascitic fluid in the posterior cul-de-sac and some-

times anterior to the uterus. In the presence of extreme congestion the subperitoneal tissues of the pelvis are soft and edematous and without surgical care the peritoneum itself tears easily. In a greater number of cases fine adhesions exist posterior to the uterus which in the absence of a history or other evidence of infection suggest the mild irritation of a chronic congestion. These peritoneal findings and their relationship to congestion and chronic parametritis have been emphasized particularly by Condamin.[4]

Attacks of Acute Abdominal Pain form a definite part of the clinical picture of pelvic congestion. Such attacks occurred at some time in the history of twenty-three of the patients in this series. It is noteworthy also that at least thirty-four patients had had their appendices removed, often apparently from an erroneous diagnosis, before presenting themselves for the treatment of their present complaint (Table VII).

These acute attacks may simulate peritonitis from acute appendicitis or salpingitis, but temperature, leucocyte count, and sedimentation rate tend to remain normal. Another distinguishing feature is the disproportionate degree of agitation, restlessness, and emotional reaction to the pain. Descriptions of such "crises" in the course of the development of the cystic ovary are noted by Forgue and Massabuau[14] and by Colaneri and Douay.[1]

The pathologic basis for this pain is not at all clear. At times it may be the pain of bleeding from a rupturing follicle. In others it seems more likely that it results from the sudden engorgement of the congested ovary and the stretching of the capsule of the distended organ.

6. *The Vulva.*—

Vulval symptoms of pain, burning, sensations of swelling and of pruritus are given a prominent position in the symptomatology of pelvic congestion by several writers.[7, 20, 25, 30, 38] The physical appearance of the vulva is noted as violaceous in color, with edema of the labia and sometimes varicosities.[1, 11, 12] Such symptoms and signs appeared only occasionally in this series. Cases of pruritus may, however, at times fall into this group, and chronic pelvic congestion should be thought of as the cause of atypical vulval complaints of otherwise unexplained origin.

Of different significance was the incidence of hypertrophy of the labia minora, which will be given consideration under the topic of etiology.

7. *The Bladder and Urethra.*—

It has already been pointed out that, on account of the multiple anastomoses between their respective venous systems, disorders of circulation in the uterus would be apt to affect bladder and rectum as well.

Urinary discomfort at some time in the course of their illness was reported in forty-five patients of this series. In the great majority this was a fairly mild aspect of the trouble. In the four cases cystoscoped, the characteristic finding was a congestion and edema of the trigone with negative urine cultures in all but one patient.

Many writers on pelvic congestion and allied conditions mention the urinary symptoms of frequency, vesical tenesmus, and burning urination.[3, 7, 9, 10, 11, 12, 20, 21, 30, 31, 32, 38, 39, 44] The absence of signs of infection in the urine in these cases is noted by Kehrer[31] and Condamin.[5]

8. *Rectum.*—

Pronounced rectal symptoms occurred only a few times in this series and hemorrhoids were not of significantly increased frequency. In the literature, however, rectal pain, painful defecation, and tenesmus and dilatation of the hemorrhoidal veins are given considerable attention as a part of the syndrome of pelvic congestion.[5, 7, 9, 11, 12, 13, 14, 20, 21, 27, 30, 31, 34, 36a, 38, 39] Possibly the dilatation of the visible hemorrhoidal veins is often a measure of the condition of the more inaccessible portions of the pelvic venous system.

9. *The Breasts.*—

The association of breast signs and symptoms with those in the pelvis is of more significance than the simultaneous occurrence of any of the conditions heretofore discussed. With the breasts involved, one cannot explain coincidence on the basis of an anastomosing circulation or even on an identical local cause, but must assume a more general agent having a constitutional effect to which both breast and pelvic reproductive organs are susceptible.

Reference has already been made to previous series of patients with chronic mastitis in whom symptoms and signs of pelvic congestion were frequently present (Taylor,[41, 42, 43]). The present study demonstrates the opposite, namely, that breast signs are frequently present in a series of cases of pelvic congestion.

Breast Pain: Premenstrual breast pain was noted by eighty of the women in the present group (Table XV). This, on account of the commonness of the symptom, would be of doubtful significance were it not for the fact that forty-one of these patients experienced this symptom for the first time with the onset of the pelvic disorder and eight noted an increase in breast symptoms simultaneously with their pelvic complaints.

Breast Swelling: Twenty-seven of these patients experienced significant breast swelling before each period, an indication of considerable intravascular or extravascular fluid increase.

Physical Characteristics of the Breast: Sensitivity to examination was noted in thirty-nine cases and nodularity of varying degree in seventy-three (Table XVI). The evaluation of breast consistence is difficult, but in at least ten the nodularity was so marked as to be regarded as definitely pathological.

TABLE XIV. BREAST SYMPTOMS

Premenstrual Pain.—	
Severe	6
Moderate	75
None	9
No note	15
Duration of Pain.—	
Onset with present illness	41
Increase with present illness	8
Pain present "always"	31
Decrease recently	1

TABLE XV. CONDITIONS OF BREASTS ON PHYSICAL EXAMINATION

	SENSITIVITY		CONSISTENCE			
	NORMAL	TENDERNESS	NORMAL	SLIGHT NODULARITY	MODERATE NODULARITY	MARKED NODULARITY
Women with children	33	14	11	15	17	4
Women with abortions only	6	11	2	2	8	5
Women with no pregnancies	27	14	19	10	11	1
Total	66	39	32	27	36	10

C. The Effects on Reproduction and Fertility

The reproductive histories of these patients are of importance both as part of the clinical picture and as offering some points on the etiological basis of the disorder.

The General Marital and Reproduction History has already been presented in Table II. It is noteworthy that only forty-three of the seventy-eight married women (55.1 per cent) had borne a child by the time of their first visit. Twelve more, however, had had abortions, spontaneous or induced, making a total of 55

(70.5 per cent) who had demonstrated some degree of fertility. In view of the fact that a third of those who had never conceived had used birth control throughout their married lives this does not appear to indicate any initial tendency to sterility.

The Results of Previous Pregnancies (Table XVI) give figures which even in this small group of cases appear to be significant. In the entire series, including the few recorded in the separated and single women, there were a total of only 145 pregnancies. Of these only eighty (55.1 per cent) resulted in the birth of living children, the remainder ending in abortion. Of the sixty-five pregnancies terminating in this way, thirty-seven were apparently spontaneous, twenty-eight artificially induced by some means. The results of the 145 pregnancies become therefore: normal delivery at term, 55.1 per cent; spontaneous abortion, 25.5 per cent; induced abortion, 19.3 per cent.

Assuming the correctness of the figures, one must conclude that the incidence of spontaneous abortion in the group is probably significantly high and the incidence of induced abortion almost certainly so. Errors in the histories would have the effect of decreasing the apparent frequency of induced abortion.

Induced abortion has been frequently regarded as the cause of a "chronic parametritis," the thinking on this subject having always been somewhat vague, particularly as regards the survival and persistence of bacteria. It is possible that the abortion is associated with a pelvic thrombophlebitis which permanently damages the pelvic venous system and thus predisposes to venous stasis as thrombophlebitis does in the leg. On the other hand, it is conceivable that the abortion is chiefly of social or psychological significance, the outward sign of family disharmony or economic uncertainty or else the beginning of a period of emotional strain and new attitudes toward sexual relationships.

TABLE XVI. RESULTS OF PREVIOUS PREGNANCIES

TOTAL PREGNANCIES	TOTAL TERM PREGNANCIES	TOTAL SPONTANEOUS ABORTIONS	TOTAL INDUCED ABORTIONS
145	80	37	28

The Fertility of the Married Group: In Table XVII data are presented on the fertility of the seventy-eight married women. Of seven women who had been pregnant within two years, all but one were using contraceptives, the single exception conceiving within eight months of her first visit. Of thirty-seven women who had not been pregnant within two years and on whom exact contraceptive data were available, twenty-three were using birth control and fourteen were demonstrating their infertility. Of twenty-three women who had never been pregnant, sixteen were not using birth control.

At least thirty of these women were, therefore, infertile at the time of their coming for treatment and thirty-seven were using contraceptives and their fertility was therefore unproved. The reasons for this infertility are of possibly great practical importance.

Tubal Patency: Of the thirty-one patients not using birth control only about one-half were concerned about their infertility. Seventeen patients were tested for tubal patency (Table XVIII). Of these, two had closed tubes and ten apparently normal tubes. In five, there were initial failures of the gas to pass at normal levels of pressure, but in these the pressure fell to nearly normal levels after the first passage of gas at between 150 and 200 mm. of mercury. One patient in whom the latter phenomenon was noted conceived promptly thereafter.

Subsequent Pregnancies Under Observation: In the group of married women there were observed nine subsequent pregnancies. Five of these resulted in term infants, one in miscarriage, two in induced abortions, while in one the

record of the latter part of pregnancy was never obtained. Conceptions occurred in these cases from three months to four years after they had been first seen. Seven of these were in women who though not practicing contraception were not conceiving at the time of their first visit, while the remaining two simply conceived after discontinuation of birth control.

Course of Pregnancy: There is, as noted in Table XVI, an apparent tendency for these patients to abort. The symptoms arising during the pregnancy of several of these patients suggest that these abortions may be due either to a hyperirritability of the uterus or to partial separation of the placenta, perhaps from a vascular disturbance in the decidua.

TABLE XVII. FERTILITY IN MARRIED WOMEN

	NO DATA ON BIRTH CONTROL	USING BIRTH CONTROL	NOT USING BIRTH CONTROL
Pregnant within two years	0	6	1
No pregnancy for over two years	11	23	14
No pregnancy at any time	0	7	16
Total	11	36	31

TABLE XVIII. TUBAL PATENCY AND SUBSEQUENT PREGNANCIES IN PATIENTS NOT USING BIRTH CONTROL

PREVIOUS PREGNANCY RECORD	TOTAL CASES	TUBES OPEN	TUBES CLOSED	TUBES UNTESTED	SUBSEQUENT PREGNANCY
Pregnant within two years	1	1	0	0	1
No pregnancy for over two years	14	6	1	7	4
No pregnancy at any time	16	8	1	7	2
Total	31	15	2	14	7

Even without the threat of abortion, considerable pain may persist during the first weeks of gestation and may even increase as a result of the hyperemia of pregnancy. Especially if there is tenderness in a cystic ovary, there is a real danger that these women will be operated upon for ectopic pregnancy. The pain tends to diminish as pregnancy progresses. After parturition, improvement is apt to remain, at least for some time, a point commented on by several writers.

Sterility is referred to frequently in the literature as one of the results of chronic congestion.[7, 10, 20, 30, 31, 39] Two authors, Schultze[39] and Cotte, note that the sterility is not absolute and pregnancies may occur at times in spite of the condition. Schultze found sterility in the "inflammatory" stage, but not in the later fibrotic stage. The unexpected pregnancies occurring in previously childless women that follow a husband's return home after a protracted absence may result from the opportunity afforded for a long-existent chronic congestion to subside.

The relative sterility in these cases may have its basis in several parts of the reproductive tract. The endocervicitis offers a possible bar to the migration of the sperm. The congested endometrium may afford unfavorable ground for nidation. The tubes may be swollen or their folds agglutinated, a possibility suggested by the behavior of several cases to insufflation. Finally, ovarian function may be disturbed either temporarily by congestion or permanently by the process of fibrosis.

D. General Associated Nervous System Symptoms

The past students of "chronic pelvic congestion," or "chronic parametritis," of "sclero-cystic ovaries," and of "chronic mastitis" have almost without exception stressed the accompanying psychic and nervous disorders. These were prominent also in this series of patients.

On the basis of both the literature and the present material, the following outline seems a practical one under which to describe these aspects:

1. Localized disturbances in sensation.
2. Symptoms referable to special organs.
3. General symptoms of nervous tension.
4. Disturbances of sexual function.
5. Disturbances of mood and other psychiatric manifestations.

1. *Localized Disturbances in Sensation.*—

Local disturbances in sensation have been referred to by a number of writers on chronic parametritis, on pelvic congestion, and on the cystic ovary. Pruritus vulvae and various other vulvo-vaginal discomforts have been noted.[1, 3, 7, 11, 12, 16, 17, 30, 31, 35, 38] Hyperesthesia of various areas of the abdomen, back, and thighs is described by Young,[44] and Freund,[21] a finding comparable to the cutaneous tenderness so often observed on the chest wall, shoulder, and neck in cases of chronic mastitis (Taylor[41]). Coccydynia has been regarded, probably correctly, as a part of this clinical picture.[20, 36]

The histologic descriptions of congestion and fibrosis of the autonomic nerve fibers and ganglia of the pelvis, already referred to, offer a possible anatomic basis for these symptoms. It is noteworthy that Cotte[6, 8] and some of the other French authors recognize a special category of "hypogastric plexalgias" and Young,[44] although with a different idea of pathogenesis, describes the areas of referred iliac fossa pain from cervical disease and treats them by injection of Frankenhäuser's ganglion.

It is thus possible that within the group of cases under discussion there are two subtypes, in one of which the vascular symptoms of engorgement dominate the picture while in the other there is a prominent "neuralgic" element. In the gynecologic area the two types are typically represented by "congestion utérine" and "plexalgia hypogastrique," while the equivalents in the breast are "premenstrual engorgement" and "mastodynia."

These "neuralgic" aspects, although prominent in a few cases of this series, were not of great frequency. In each instance the "neuralgic" symptoms were so closely associated with the vascular that it did not seem possible to separate the two categories of cases.

2. *Symptoms Referable to Special Organs.*—

Probably as a result of the same autonomic nervous system disturbances which are a factor in producing pelvic complaints, these patients have symptoms suggesting functional disorders of the gastrointestinal system, heart, and sometimes respiratory tract (Table XIX).

Cardiac symptoms of dyspnea or the sense of dyspnea, tachycardia, palpitation, or mild pain were prominent in fifteen instances. Such symptoms are noted by the French authors in particular,[5, 7, 11, 12] but also by Freund[21, 22] and Kehrer.[30]

Gastric symptoms of nausea, flatulence, or epigastric distress were noted especially in twenty-four patients, a corroboration of the constant reference to these symptoms in the literature.[4, 5, 11, 12, 30, 34]

Colonic disorder in the form of attacks of diarrhea, usually with mucus, occurred fifteen times. These symptoms are noted almost universally by the modern French writers and by a number of others.[18, 21, 25, 30, 44] Goodall and Power[25] make a special reference to the association of mucous colitis with "metrallergy" and reported a series of two hundred cases of mucous colitis in which there was observed a simultaneous increase in leucorrhea with exacerbations of the colonic symptoms.

Upper respiratory disorder has been reported in the form of bronchial and laryngeal spasm,[7, 21, 22] pharyngitis,[1, 11, 12] and rhinitis.[22] Allergic problems

referable to nose and throat were prominent in the histories of four of the cases of this series.

Other symptoms suggesting autonomic nervous system imbalance have also been reported, such as tendency to blushing[30, 31, 37]; attacks of weeping[5]; certain eye symptoms[22]; and dermatoses.[13, 37] A tendency to tears during the office consultation has seemed characteristic of many of the patients of this series.

TABLE XIX. EXTRAGENITAL PSYCHOSOMATIC SYMPTOMS

	MARRIED	SINGLE	SEPARATED	TOTAL
Tension	24	7	4	35
Fatigue	22	4	3	29
Insomnia	11	2	4	17
Headaches	25	2	2	29
Gastric	17	4	3	24
Colonic	13	1	1	15
Cardiac	9	2	4	15
Upper respiratory "allergic disorder"	4	0	0	4
Cases with at least one significant extragenital complaint	62	12	10	84

3. *Symptoms of General Autonomic Disturbance.*—

These patients complain also of more general symptoms, having to do apparently, with states of emotional tension. These may be grouped under four headings.

Tension: The symptoms of tension are described by the patient as "nervousness," "irritability," tendency to attacks of trembling and to crying spells. At least one of these symptoms is usually present in a majority of these cases, but was quite prominent in thirty-five. It has been referred to by many writers.[1, 5, 7, 12, 13, 30, 37] This state of irritability is increased before the periods and suggests a relationship of the whole syndrome to the entity described as "premenstrual tension."

Fatigue: Loss of energy, a sense of exhaustion and invalidism without adequate cause are also commonly reported.[11, 12, 22, 25, 26, 29, 30, 35, 38, 44] Fatigue was specifically complained of by twenty-nine of the cases of this series.

Headaches apparently associated with the onset of the present illness were noted also in twenty-nine instances. These were not exceptionally severe, not of a characteristic migraine type, nor predominantly premenstrual in time. Headaches are also referred to by many previous writers on this subject.[1, 7, 11, 12, 13, 14, 30, 36a]

Insomnia: Minor degrees of disturbances to sleep are found at least at times in most of these cases, but insomnia was a prominent feature in seventeen. Sleeplessness has been referred to by several previous writers.[30, 36a, 38]

4. *Disturbances of Sexual Function.*—

It was to be expected that a gynecologic condition based on a vascular and autonomic nervous system disorder should gravely affect coitus. Dyspareunia is in fact almost universally present, when the condition has lasted any considerable time.

Painful intercourse was noted in forty-nine of the sixty-three married women in whom information was available on this point (Table XX). The pain felt is not at the introitus, but is deep in the pelvis and undoubtedly arises from the tender, congested, or spastic, uterosacral ligaments. A related symptom is the increased lower abdominal and back pains experienced by some of these patients on the day following intercourse, apparently the result of the increase in pelvic congestion. Such painful intercourse has been accorded a prominent place in symptomatology by most writers on the subjects of pelvic congestion and of "chronic parametritis."[11, 12, 13, 14, 22, 27, 28, 30, 31, 39, 44]

Frigidity was also noted in about two-thirds of the patients questioned on this point (Table XX). Absence of sexual feeling in these women was usually not primary, but developed gradually months or years after marriage. This also is a common symptom according to past writers.[2, 22, 30, 31, 36] It may be entirely psychogenic in origin or, as Condamin[2] has suggested, a result of congestion or fibrosis of the hypogastric plexus and cervical ganglia.

TABLE XX. DISORDERS OF SEXUAL FUNCTION IN MARRIED GROUP

	PAINFUL COITUS	FRIGIDITY
Present	49	29
Absent	14	15
No intercourse	7	7
No data	8	27

The contribution of dyspareunia and other sexual factors to the causation of the whole disorder will be further discussed under the heading of "Etiology."

5. *Disturbances of Mood and Other Psychiatric Manifestations.*—

Psychiatric disturbances, usually of an emotional character, are a common accompaniment of pelvic congestion and its allied conditions. This has been characterized as an hysteria by the older writers (Freund,[22] Graefe),[26] as a "psychosexual" disorder by Kehrer[30] and Meyer-Ruegg.[36] Others note a tendency to worry (Colaneri,[1] and Kehrer[31]), to depression,[1, 5, 11, 12, 18, 22, 30, 31, 37] to neurasthenia,[11, 12, 23, 29] and to anxiety.[44]

A systematic psychiatric study of this series of patients was not attempted. There have been recorded in Table XXI, however, two categories of cases, one in which a formal diagnosis had been made by a psychiatrist; the other in which the psychiatric complaints were sufficiently evident to make a general characterization of the condition possible, even for one not trained in psychiatric diagnosis.

TABLE XXI. INCIDENCE OF OBVIOUS PSYCHIATRIC FACTOR

	MARRIED	SINGLE	SEPARATED	TOTAL
History of nervous breakdown	6	1	1	8
History of anxiety neurosis	2	1	0	3
History of attempted suicide	1	1	2	4
Other formal psychiatric diagnoses	6	2	3	11
Complaint of depression	3	0	0	3
Complaint of anxiety	12	2	0	14
Other definite psychiatric complaints	1	2	0	3
Total cases with obvious psychiatric aspect	31	9	6	46

A formal diagnosis was made by a psychiatrist in twenty-two patients (Table XXI). The problems were all in the general category of "anxiety neurosis" or "depression" and had led to "nervous breakdown" or "attempted suicide" in a number of instances. In twenty more cases the patients themselves reported a definite problem of anxiety or depression, and in many others degrees of emotional instability were evident. A very considerable number of these patients have, therefore, significant psychiatric difficulties.

The older view held that the pelvic disorders were primary and "evoked" the mental state. At least as important, however, is the effect of a primary state of emotional tension on the smooth muscle and secretory cells in the pelvis in producing "psychosomatic" effects comparable with those produced elsewhere in the body.

Summary and Conclusions

The symptoms and physical signs of a local vascular disorder affecting uterus, cervix, ovaries, parametrium, and breasts have been described in detail on the basis of an analysis of 105 selected cases. Evidence based largely on gross pathologic findings has also been presented to show that prolonged congestion may lead to tissue fibrosis of these organs.

A diminution in fertility and possibly a tendency to miscarriage were also found in this series of cases.

Of frequent occurrence also was a group of symptoms referable to the nervous system, including localized disturbances of sensation, "psychosomatic disorders" of various extragenital organs, nervous tension, disturbances of sexual function, and certain psychiatric manifestations.

The typical local findings in the reproductive organs, with the general signs of autonomic instability, present a consistent and characteristic clinical picture which seems properly termed, at least provisionally, the "Congestion-Fibrosis Syndrome."

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VASCULAR CONGESTION AND HYPEREMIA*

Their Effect on Function and Structure in the Female Reproductive Organs

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PART III. ETIOLOGY AND THERAPY

A DISORDER of the reproductive organs based on hyperemia and congestion has been described in the two earlier sections. The clinical aspects of the so-called "congestion-fibrosis" syndrome have been outlined through a review of the collected literature and the detailed analysis of one hundred five selected cases. Etiologic points have been incidentally referred to but still require special attention. The causes of the disorder and a resulting plan of therapy are therefore the subject of this, the final section, in a series of three papers.

Etiologic Considerations

In taking up the question of etiology, it is necessary to refer back to the physiologic introduction of Part I, in which the factors which might affect the pelvic circulation were listed. These included a special constitutional predisposition, mechanical factors, inflammation, the hormones, especially the estrogens, and autonomic nervous system influences.

1. Constitution.—

Constitutional factors in pelvic congestion may be local or general and both have been considered by previous writers. One view has been that the blood vessel walls of these patients are anatomically poorly developed,[9, 28] leading perhaps to vascular disorders through the formation of varicosities.[2] A somewhat similar concept supposes that it is the infantile or undeveloped genital organs which are most readily affected when the sexual function is overtaxed.[27, 28] A suggestion of relative underdevelopment of the reproductive organs as a predisposing cause was found in nine women of the present series of cases who after a history of delayed menstrual periods in their earlier years developed dysmenorrhea with still more disturbed menstrual cycles after marriage.

A more generalized predisposition is implied by other writers who speak of a "vasomotor impressionability,"[20, 21] of a "neurasthenia,"[17] or of a mysterious state termed by the French "neuroarthritism."[22, 58] Numerous references are also found in the literature to a disturbed sympathetic nervous system in these patients.[6, 9, 22, 39, 40, 51, 57, 59, 60]

The view of a general vasomotor or autonomic predisposition receives considerable support from the associated extragenital symptoms already described (Table XIX, Part II). It is perhaps also of significance that both blood pressure and basal metabolism tend to be a little low. The average systolic blood pressure reading for these cases was 105, the average diastolic 65. The basal metabolism was also usually a little below the average, for among fifteen patients tested, four were between 0 and –4 and seven below –10. It is of course a question whether the signs of vasomotor instability are constitutional, in the sense of being congenital, or represent simply a temporary state associated with the genital disorder.

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2. Mechanical Factors.—

Various mechanical factors may evidently affect the flow of blood through the pelvic vessels and thus alter local intravascular pressure, especially in the veins. Changes in any of the mechanical factors result in rapid, although temporary, variations in the symptoms of pelvic congestion.

a. The Standing Position: A most convincing demonstration of the effect of gravity is the relief experienced by the patient with pelvic congestion when she lies down. Conversely, leucorrhea, menstrual bleeding, and backache are notoriously increased by long periods of standing. It seems almost obvious that alterations in position affect symptoms through a change in venous pressure and resulting change in degrees of congestion.

b. Fatigue: The factor of fatigue was evident in many of the cases of this series and is frequently given as a symptom by these patients. It has been accorded importance by many other observers.[6, 9, 20, 21, 22, 28, 30] Fatigue, resulting in a loss of muscle tone, may simply make the effects of the standing position more apparent. On the other hand, it may result in increased nervous tension and so add to the effects of the "vasomotor impressionability."

c. Malposition of the uterus has been held a factor in congestion by French, German, and American writers.[6, 9, 14, 20, 21, 22, 29, 55, 73] The malposition may cause congestion through a kinking of the veins, by adding to the effects of gravity as in descensus, or simply through the often associated defective fascial support of the pelvic vessels.

It is difficult to evaluate the importance of malposition in the present series. A retroversion of appreciable degree was present in a third of the cases. In at least ten cases a suspension had been performed prior to the first visit of the patient and in fifteen cases this operation was subsequently performed. The results in these ten previously performed suspensions were obviously unsatisfactory and in those performed subsequently not completely so. Dickinson[17] on the basis of one hundred cases denies that the incidence of retroversion is any higher in a series of cases of "chronic parametritis" than among office gynecologic patients in general.

The observation of a few striking cases, however, makes it appear probable that retroversion is at times the principal, although not the sole, factor. The diminution in backache after the insertion of a pessary is a common observation and in two cases of this series a menorrhagia disappeared with the same type of therapy. Cotte[9] graphically demonstrated by Lipiodol injection the reduction in size of the uterine cavity which followed suspension of the enlarged congested uterus. This change in size seemed clinically evident in similarly treated cases of this series. Retroversion is not, therefore, to be regarded as the source of symptoms, but in at least some instances predisposes to the congestion which produces the symptoms.

d. Constipation: The anastomoses between rectal and uterine venous systems have been referred to and the point made that disorders of circulation affecting one area would be evident in the other also. Rectal symptoms and the frequent presence of hemorrhoids have been reported in cases of uterine congestion. Conversely, constipation with straining at defecation has been suggested as a source of pelvic congestion[4, 5, 9, 54, 62] and seems an important factor in some cases.

3. Inflammation.—

Inflammation may affect local circulation in two ways, through the hyperemia of the active stage of the infection and through permanent damage of vessels and lymphatics. The former is certainly the more obvious factor in the pelvis, but the latter possibly more important.

The difficulty of separating the effects of congestion and of inflammation in cases of severe cervicitis with pelvic pain has already been discussed. The favor-

able effects of treating the cervix are to be noted, and at least one group of writers ascribe to cervicitis an important role in the production of chronic parametritis.[31, 66]

The "apparent precipitating cause" of the symptoms of pelvic congestion, as noted by the patient, is shown in Table I. The figures indicate "abortion" and "childbirth" as the second and third in relative importance. Miscarriage, especially induced abortion, has been frequently cited in the past as the cause of chronic parametritis[6, 9, 63] and indeed this seems to be a common clinical assumption.

Parturition at full term may lead to congestion as a result of weakened pelvic supports, but this mechanism can hardly explain congestion or "parametritis" after abortion. The persistence of a true infection in the parametrium for years after a miscarriage likewise seems a hardly tenable hypothesis. It seems better in those cases dating their pelvic symptoms from an abortion to ascribe them, as Cotte has done, to a "postpuerperal phlebitis" and permanent injury to local vascular structures.

TABLE I. APPARENT PRECIPITATING CAUSE

	MARRIED	SINGLE	SEPARATED	TOTAL
Marriage	17			17
Marital discord	5		1	6
Separation from husband	4			4
Engagement		2	1	3
Divorce			3	3
Direct coital relationship	5	1	1	7
Childbirth	9			9
Abortion	10	1	1	12
Tragedy in family	1	4	1	6
Accident to patient	2		2	4
Operation on patient	2	1		3
No apparent cause	23	7	1	31
	78	16	11	105

4. The Estrogens as a Cause of Hyperemia.—

The part played by the estrogens, and perhaps progesterone, in the etiology of pelvic congestion requires careful thinking and precise statements. In particular, distinction must be made between the estrogens in normal quantities as essential prerequisites for the condition to develop and the estrogens in excessive amounts as the specific causative factors.

a. The Role of Normal Quantities of Estrogens: After the removal of the ovaries or the suppression of their function by radiation or by their exhaustion at the menopause, signs and symptoms of congestion of breast and pelvis diminish. Within a few months there remain only, and that rarely, some of the "neuralgic" complaints, atypical vaginal pain, coccydynia, and breast tenderness. The engorgement, backache, and leucorrhea soon disappear. This change is surely correlated with the loss of ovarian activity.

Furthermore, it is evident that the peak of congestive symptoms in the menstruating woman occurs in the days before the onset of each period. It is probable that this rhythmic increase in symptoms in the premenstruum is due to the physiologic increase in blood estrogen or perhaps progesterone concentration. This, however, is not evidence of unphysiologic levels of hormone as the cause.

b. The Possibilities of Hyperestrinism: In many of these patients the clinical picture closely resembles what has been called "premenstrual tension." For the latter condition an estrogen excess has been assumed,[26, 38] perhaps as a result of overproduction or as the indirect result of a vitamin B deficiency.[3]

There is, however, no real evidence that the women with pelvic congestion have excessive activity of either follicles or corpus luteum. The menstrual periods are usually normal and when disturbed are as often scant as excessive. The pattern of endometrial tissue examined in this group of cases, as in that previously reported for cases of chronic mastitis (Taylor[71]), corresponds with that expected for the time of the cycle and hyperplasia is not characteristically found.

Hormone assays were not done in any of the cases of this study, but were carried out in several cases previously reported in which breast engorgement was the point of special interest but in which signs of typical pelvic congestion were incidentally present.[72] In two such cases reported in 1942 (Taylor[72]), and in seven cases in 1936 (Taylor[71]), complete assay was made of the full cycle of estrogen excretion, the tests being made on consecutive 72-hour samples. On the basis of these nine cases, representing breast engorgement, the painful "cystic ovary," and "chronic parametritis," no typical disorder of estrogen excretion could be discovered.

In spite of the temptation to ascribe excessive pelvic hyperemia to the estrogens there is no real evidence for such a view. It is far more likely that estrogen activity within a normal range provides the normal cyclical variations in vascular behavior upon which are superimposed the effects of abnormal mechanical conditions and abnormal sympathetic nervous system stimuli.

5. The Sympathetic Nervous System.—

The nervous system factors causing vasodilatation in the pelvis may apparently be specifically sexual or nonspecific emotional stimuli. Both of these groups have been considered extensively in the literature and were evident factors in this series of cases.

a. Sexual Factors in Pelvic Congestion: A variety of different circumstances within the area of sexual behavoir have been held responsible, including excessive coitus[6, 9, 10, 20, 21, 22, 28]; abstinence[9]; masturbation[4, 9, 18, 23, 25, 27, 28, 39, 40, 49]; and contraceptive measures, particularly coitus interruptus.[22, 24, 32, 33, 39, 40, 49, 61] Evidence from the present series of cases can be found to show that each of these causes is at least occasionally operative.

Psychological rather than local reflex stimuli in the production of hyperemia on a sexual basis have been assigned a prominent role by other writers.[7, 39, 40, 49, 51] These are obvious factors, although it is perhaps going too far to agree with Lawson Tait who in 1883 warned against the possible ill effects of piano lessons on the ovary of the adolescent female.

Excess: In seven instances in the present series (Table I), an attack of acute pelvic discomfort appeared to be directly attributable to excessive sexual activity. In several of these the difficulty seemed to arise from unequal sexual requirements and capacities of husband and wife.

Abstinence: In four instances (Table I), chronic pelvic discomfort developed in young married women whose husbands were separated from them while in the army. These were all relatively mild cases with moderate pelvic discomfort and rapid improvement.

Contraception, as such, could not be held as responsible in any single case nor did the data on types of birth control employed point to any technique as especially harmful (Table II). The fact remains, however, that all birth control devices are at times capable of disturbing normal coital function and in this way must in some women be productive of disturbed vascular conditions in the pelvis. It is also conceivable that years of sexual activity without pregnancy may have deleterious effects.

TABLE II. TYPES OF BIRTH CONTROL IN MARRIED GROUP

No birth control	31
Condom	10
Douche	10
Interruptus	6
Diaphragm	3
Abstinence	7
No information	11

Masturbation was not included in the routine history of these cases on account of the obvious difficulty of eliciting such data in an ordinary clinical gynecologic history. Since labial hypertrophy, especially when unilateral, has been interpreted as indicative of excess in this practice,[15, 41] it is interesting to note how frequently this hypertrophy, especially in its more marked degrees, was recorded in the single women of the series (Table III). Fränkel,[23] in particular, believed masturbation to be a factor in producing "chronic parametritis" in the unmarried.

TABLE III. INCIDENCE OF HYPERTROPHY OF LABIA MINORA

	TOTAL CASES IN GROUP	SLIGHT OR QUESTIONABLE HYPERTROPHY	MARKED HYPERTROPHY
Married	78	11	3
Single	16	8	4
Separated	11	1	2

Dyspareunia, in the form of frigidity or painful intercourse, has already been noted as of nearly universal occurrence in these patients (Section II, Table XX). These symptoms are doubtless the result of the congestion but also in that they interfere with normal coital physiology are perhaps the most important cause of the continuation of the congested state.

In summary, it appears that any form of sexual stimulus, whether this be direct or simply psychologic, which produces a pelvic hyperemia and does not shortly provide for relief from it, will lead to a state of congestion, which with constant repetition will become chronic.

b. Nonsexual Nervous System Factors: Certain nonspecific psychological factors have also been suggested as causes of pelvic congestion. These have included fear of pregnancy or infection, hate or dislike of partner, marital incompatibility, conflicts and anxieties of all sorts.[16, 40, 42, 49, 51, 76]

TABLE IV. INCIDENCE OF SPECIAL SOCIAL PROBLEMS

	MARRIED	SINGLE	SEPARATED	TOTAL
Marital discord	22			22
Recent divorce			8	8
Separation from husband	6			6
Special sexual problems	3		1	4
Engagement problems		3		3
Premarital affairs	1	1		2
Death or illness in family	3	3	1	7
Accidents to patient	2		2	4
Conflicts in job	1	1		2
Total cases with at least one obvious social problem	36	8	6	50

In about half of the patients of this series (Table IV) there was an obvious social problem, capable of producing a state of stress. In a few cases the actual

precipitating factor appeared to be a single incident or event, affecting perhaps the patient's sense of security, such as an accident or operation, the patient's own divorce, or the death of a relative (Table I). In a larger group there existed major social problems, particularly concerned with the marriage relationship and therefore difficult to separate from associated sexual problems, but undoubtedly the cause of a general state of nervous stress.

It seems certain that such factors as these, which now admittedly affect gastrointestinal blood supply, motility, and secretion should have a comparable effect on the smooth muscle and secretory cells of the pelvis. It is not, however, often clear whether the emotional manifestations in these patients are entirely the cause or may be in part the result of the vasomotor disorder in the pelvis.

Summary of Etiologic Factors

Pelvic congestion is, therefore, a disorder of the pelvic circulation with multiple causes, several of which may have to be present in a single patient to produce symptom-giving conditions. Predisposing constitutional factors are probably present in the autonomic nervous system and perhaps in the blood vessel structure of the susceptible patient. The tendency to congestion is increased by loss of support of the pelvic structures after parturition, by malposition of the uterus, possibly by damage to the veins from postpartum phlebitis, and by occupations requiring the erect position and leading to excessive fatigue. The estrogens maintain the pelvic tissues in a state receptive to those stimuli and their physiologic premenstrual rise places most of the complaints in that part of the cycle, but this disease is not due to any primary ovarian or other endocrine disorder. The autonomic nervous system is responsible for both acute and chronic vasodilatation as a result of unphysiologic sexual behaviors as well as nonspecific emotional states.

Chronic Congestion as an Etiologic Factor in the Origin of Neoplasms

The existence of a stage of fibrosis developing on the basis of a long-standing congestion in fundus, cervix, breast, parametrium, and ovary has been discussed. There remains to be noted the possibility raised by several writers of more definite neoplastic processes arising on this basis.

In a previous paper on chronic mastitis (Taylor[72]), it was suggested that premenstrual engorgement could lead to a fibrosis or an adenofibrosis within which might arise foci of adenomatous proliferation of small ducts and acini. The morphologic similarity of adenofibrosis of the breast and adenomyosis of the uterus (Taylor[72]) is striking, and for adenomyosis Moench[52] has also postulated chronic congestion as the responsible cause. Finally, endometriosis, a neoplastic condition closely related structually to adenomyosis has been theoretically ascribed by Meigs[50] to delayed pregnancy. The mechanism by which the latter is effective is conceivably the congestion of repeated menstrual periods unrelieved by pregnancy.

The morphologic similarity of these three processes, with their mixed proliferations of epithelium and of fibrous or muscular stroma, is quite apparent. Aschoff[1] drew attention to the analogies between these diffuse neoplastic conditions of breast and uterus and, as others have done, added "adenomyosis" of the prostate to the group.

Myomas of the uterus tend to occur in somewhat the same type of patient as does endometriosis, namely, in the unmarried or in the infertile. Many of the older writers held the absence of pregnancy as a contributory cause. Kehrer,[39] in particular, after a study of 500 cases, ascribed the growth of fibroids to the developmental stimulus of chronic hyperemia upon seeds of displaced embryonal cells.

These are remote possibilities, but in the absence of any other acceptable explanation of these tumors may not be entirely discarded. The history of the following patient, in whom the pelvic organs were inspected at three operations over a twelve-year period, is offered simply as an example of the possible evolution of this disorder.

Case Report

Mrs. R. K. was admitted to the Sloane Hospital in the Columbia-Presbyterian Medical Center on April 23, 1948. The patient, then 37 years of age, had been married since the age of 18 years. Her first child was born a year after marriage, and was delivered with great difficulty after a labor of four days. There followed three induced abortions at the ages of 21, 22, and 23 years. At the age of 24, she was delivered of a premature stillbirth weighing 2 pounds and 12 ounces, the fetal death resulting from a prolapsed cord.

From about the age of 23, she began to suffer from numerous gynecologic symptoms. These consisted in pain in the back and abdomen for a week before the periods, bilateral ten-day premenstrual swelling and tenderness of the breasts, pain in the right lower quadrant and increasing dyspareunia. For these she was operated upon at the Roosevelt Hospital at the age of 25 on May 21, 1936.

At this, the first operation, the following findings were noted: The fundus was of normal size, in second degree retroversion, with slight descensus. The cervix showed deep, bilateral lacerations without much infection. The uterosacral ligaments were noted as fibrous and sharply defined. Both tubes were patent but surrounded by a few adhesions. The right ovary showed a slight thickening of the capsule and a few small cysts, but was not enlarged. The operation consisted of a dilatation and curettage, a cauterization of the cervix, a right salpingo-oophorectomy, a round ligament suspension and a liberation of omental adhesions. The pathologic report showed normal endometrium and follicular cysts of the ovary.

During the next six years, the patient improved somewhat, but continued to complain of pains in the abdomen and back, dyspareunia, headaches, constipation, and severe nervous tension. During these years she also had two more miscarriages, the second of these at six months. On November 20, 1942, she reported herself two and one-half months pregnant. The pregnancy was uneventful but on account of a borderline contraction of the pelvic inlet and the history of an extremely difficult forceps delivery and of a stillbirth she was delivered on June 5, 1943, by cesarean section at Bellevue Hospital. At the time of the cesarean section no special abnormalities of the uterus were noted.

During the next three and one-half years the patient was seen only at rather long intervals. On Dec. 27, 1943, the uterus was noted as somewhat enlarged with the left adnexa still quite tender. During 1946 and 1947, the periods began to become heavier and to be associated with clots. A year later, at the age of 37, the patient returned to report that her menstruation had become very heavy, was lasting seven days and causing her to be confined to bed for two days each month. The dyspareunia was still very marked. Examination showed the fundus to be definitely enlarged; the cervix hypertrophied and the parametrium very tender. The patient was sent to the hospital for a hysterectomy.

At this, the third operation, performed at the Sloane Hospital on April 24, 1948, the left ovary was found slightly enlarged with a very corrugated appearance and several follicle cysts. The uterus was greatly hypertrophied and there appeared to be a small fibroid on the posterior wall. The operation consisted of a complete abdominal hysterectomy, left salpingo-oophorectomy, and the division of omental adhesions.

The pathological examination (Fig. 1) confirmed the increase in uterine size, the weight being 225 Gm. and the dimensions 12.5 by 8 by 6 cm. The corpus was symmetrically enlarged and exhibited near the fundus a diffuse area, whose texture on gross examination differed only slightly from that of the surrounding myometrium. A second more nodular area was noted in the right lateral uterine wall. The myometrium itself varied from 1.5 to 3.5 cm. in thickness and presented a grossly trabeculated, vascular, edematous cut surface. The left ovary measured 5 by 2.5 by 1.5 cm. The surface was studded with small cysts containing serous fluid. The cut section displayed also many small follicle cysts and one larger hemorrhagic

cyst. Microscopic examination of the tumor in the fundus and in the lateral walls showed bundles of fibromuscular tissue with some islands of endometrial glands and stroma.

The final diagnosis was diffuse hypertrophy of the myometrium, focal adenomyosis uteri, normal proliferative endometrium, follicle cysts of the left ovary, and hemorrhagic corpus luteum.

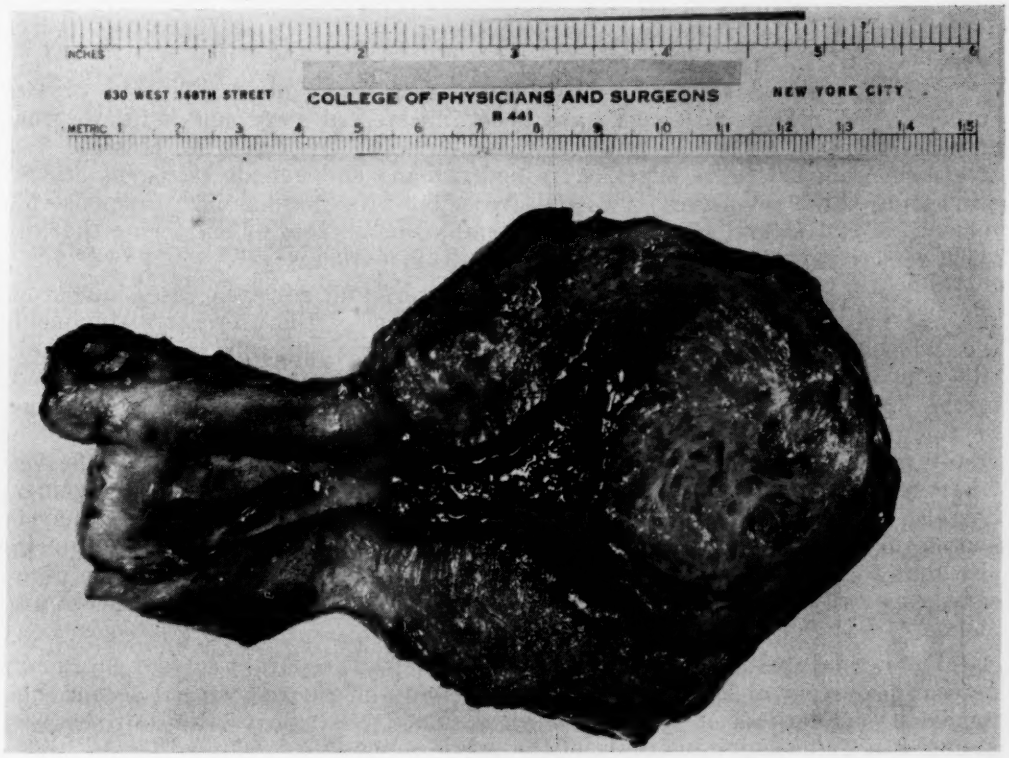

Fig. 1.—Uterus removed for adenomyosis after twelve years of observation for chronic pelvic congestion.

The Treatment of Chronic Pelvic Congestion

The various aspects of chronic pelvic congestion have been and remain notoriously resistant to treatment. The development of a rational plan of therapy depends upon the understanding of the underlying physiologic disorder and the multiple factors which contribute to it.

1. Previously Reported Methods of Therapy.—

The methods of therapy that have been reported have depended upon each writer's own conception of the nature of the disorder and upon the severity of a particular case. Certain previous methods may be noted as follows:

a. General Measures: The modern French writers are the ones most concerned with the patient's general health. They and some others emphasize the importance of physical rest[9, 20, 21, 28]; of mental calm[6, 22]; of mild exercise[9, 17, 20, 21]; of attention to the diet[9, 20, 21, 22] and the elimination of alcohol.[6, 9] The regulation of intercourse is recommended by the French authors and genital rest principally by the Germans.[23, 28, 33, 40, 43, 61]

b. Local measures are directed toward the clearing up of cervical infection, at tissue dehydration, and at the stretching or anesthetizing of the painful uterosacral ligaments. Treatment of the infected cervix is the central point in

Young's[74, 75] approach and is of course essential in those cases in which a true parametritis of cervical origin is present.[34, 36, 68] Glycerine tampons to reduce local edema are recommended by others.[9, 20, 21, 61]

From the German concept of the disease as a fibrosis or spasm of the uterosacral ligaments there developed a number of methods of therapy, including massage[9, 35, 67]; stretching of the uterosacral ligaments[37, 61]; injection of the uterosacrals with Novocain and other substances[32, 55, 69, 74]; and "episacral" nerve block.[60]

c. Endocrine therapy in a very vague sense is mentioned by one or two authors.[9, 20, 21] The androgens have been reported as very successful in what may be a special aspect of this syndrome, namely "premenstrual tension,"[26] a treatment believed to be effective by neutralizing endogenous estrogens and so preventing fluid retention. Israel[38] advocated progesterone in "premenstrual tension." Cotte[9] and Faure[20] mention radiation, a form of endocrine therapy when directed at the ovary in patients near the menopause.

d. Surgical procedures: For the more severe and resistant cases, numerous surgical procedures have been tried. The division of the uterosacral ligaments was advocated by a considerable list of gynecologic surgeons.[5, 8, 53] Fränkel[25] added to this procedure the step of inserting omental fat between the cut ends of the ligaments to prevent the reformation of retractile scar tissue. Resection of the presacral nerve is approved by several French authors,[6, 9, 12] but the results are considered unsatisfactory by Young.[75] Direct approach to the vascular system by ligation or excision of the dilated veins of the broad ligament has also been practiced.[13, 19, 27, 56, 65] Suspension of the displaced uterus may be successful in some cases,[4, 5, 35, 40] and Cotte[9] has noticed the diminution in uterine size that follows this procedure. Hysterectomy is at times believed to be necessary, especially in the cases of uterine hypertrophy with advanced structural change.[6, 20, 21, 22, 75]

Operations on the ovaries belong in a somewhat separate category. Partial or complete removal has been undertaken because of their increased size or their persistent tenderness or because of an assumed etiologic relationship between abnormally functioning ovaries and the pelvic congestion.[6, 9, 20, 21, 22]

2. Results of Treatment in the Present Series.—

Since this series of cases has been slowly collected over a number of years and the evolution of the concept of the disorder has been a gradual one, the plan of treatment has been somewhat inconsistent. Furthermore, since only severe cases of the disorder have been included, the group includes a relatively large number of surgically treated patients. Nevertheless, the series contains for the most part patients observed over a long period of time, so that a fair idea of the course of the disorder and the effects of therapy is obtainable.

TABLE V. RESULTS OF TREATMENT IN CASES OBSERVED AT LEAST SIX MONTHS

	NUMBER OF CASES OBSERVED	CURED	IMPROVED	NO CHANGE	WORSE
General treatment	30	0	14	15	1
General and local	10	0	6	3	1
Conservative abdominal surgery	14	0	5	9	0
X-ray of ovaries	2	0	2	0	0
Hysterectomy	2	1	1	0	0
Total	58	1	28	27	2

An analysis of the results of treatment is shown in Table V. It will be noted that in 58, or a little over one-half, observation was carried on for a period of

at least six months, the average period being somewhat over three years. In exactly one-half there was no improvement. Of the other half there were varying degrees of amelioration but only one apparent "cure." Chronic pelvic congestion is evidently a persistent disorder, dependent upon the basic constitution of the patient, upon more or less unmodifiable psychologic factors, or upon conditions of living which the patient is unable to alter.

A slightly more optimistic outlook is possible if one accepts the impression of the writer, that the results in patients who made only one or two visits and were, therefore, not analyzed under "results" in Table V responded quickly to simple suggestions.

The different types of treatment as carried out (Table V) show approximately the same proportion of "improved" and "unimproved" cases as does the total series. Treatment involving major alterations in the anatomy or physiology of the reproductive organs, i.e., by hysterectomy or x-ray castration, give a better outlook and this impression is borne out by the experience with other more recent cases not included in this series. Patients having considerable cervicitis, comprising most of the cases in the category labeled "General and Local" in Table V, also showed a relatively better chance of improvement. The cases without local lesions, i.e., those treated only by "general measures," showed a high percentage of failures. Finally, the patients listed under "other abdominal surgery," including in particular those treated by partial removal of the ovaries, were usually unimproved.

3. A Plan of Therapy.—

Just as there is no single etiologic factor, there is no single method of treatment for the clinical syndrome based on congestion of the female reproductive tract. A plan of therapy for the individual patient must be built up from a careful evaluation of two aspects, namely, (a) the principal causative agent and (b) the severity or the duration of the condition.

a. The Determination of the Principal Causative Factor: The initial history and physical examination should be directed toward a preliminary broad classification of the case into one of three general categories, based upon the probable origin of the trouble. The three major causes are an organic lesion, unphysiologic sexual behavior, and nonspecific emotional tension. This is perhaps an oversimplification, but many cases fall readily into one of these simple categories. The classification is made by careful attention to the circumstances of origin of the symptoms, the presence or absence of extragenital complaints, and the physical findings.

(1) When *organic factors* are important, the onset of the condition is apt to be definitely referable to delivery or abortion. The symptoms will be largely limited to the pelvis without breast or other distant psychosomatic manifestations. Examination will disclose cervicitis, malposition and possibly hypertrophy of the uterus, and relaxation of the pelvic floor.

(2) *Disturbances in coital function* as an important factor should be suspected in cases dating the origin of their symptoms from the time of marriage, less commonly to the beginning of other sexual relationships. The symptoms in this group are chiefly pelvic, although there may be breast manifestations and some general psychosomatic and emotional reactions. A sexual factor is most apt to be the source of the difficulty when on examination there is found a marked tenderness of ligaments or ovaries, moderate "endocervicitis," but no other organic pelvic defects. The obtaining of the history on a few points of sexual behavior is properly postponed until after the examination at which time it is usually not difficult. This aspect of the problem cannot, if the patient is to be intelligently treated, be omitted.

(3) *The nonspecific factors of tension* are often inextricably mixed with those of the preceding category, but at times the cases seem clearly separable. The patients in this last group are often single or separated women, or married women near to their menopause. They almost invariably present special problems of family or occupational stress. The clinical aspect of this group approaches the picture described for "premenstrual tension" with prominent breast complaints, gastrointestinal or cardiac symptoms, and pronounced emotional manifestations.

b. An Evaluation of the Severity of the Condition: In many instances, episodes of pelvic discomfort may be transitory, affecting perhaps only one menstrual period, precipitated by circumstances that are quite temporary. To this category belong brief attacks of pelvic pain, isolated menstrual periods inexplicably associated with dysmenorrhea or excessive flow, and short episodes of breast or ovarian tenderness. These cases require no treatment except observation and reassurance.

At the other extreme are the patients who have suffered for many years from any or all of the characteristic symptoms of the disorder. In these, organic change appears often to be present which through injury to nerves, blood vessels, or myometrium renders cure impossible without surgery or the therapeutic suppression of the ovarian function.

c. Trial of the Simplest Therapeutic Measures First: A final point in policy is the avoidance of haste in the adoption of any radical procedure and the trial of the simplest measures first. With these general principles in mind, the following special therapeutic measures may be considered.

(1) Local measures: Treatment of chronic cervicitis is always indicated to reduce the leucorrhea and in some cases to diminish pain from the associated chronic lymphangitis of the broad ligaments. Other local measures such as glycerine tampons, hot douches, and diathermy have a dubious position in the therapy of this condition. Constipation should be eliminated so far as possible. Standing for long periods of time and exertion causing fatigue are definitely bad, but brief periods of exercise designed to improve pelvic muscle tone and circulation are perhaps helpful.

(2) Regulation of sexual function: In the presence of severe congestion the complete temporary discontinuation of intercourse seems essential, an interdiction which includes all forms of sexual excitation, both mental and physical, which might precede or be substituted for intercourse. An attempt should then be made to eliminate factors associated with disturbed coital function, such as unacceptable contraceptive measures, undue frequency, dyspareunia, and psychologic frigidity. The possible dangers of postponed pregnancy should be explained to young married women. When marital intercourse is resumed, it should be clear to the patient that she is probably predisposed to pelvic vascular disorder and coitus should be undertaken only when her mental and physical condition, particularly with regard to absence of fatigue, is favorable.

(3) General health measures: Attention to the patient's general manner of living, especially the strains imposed on her emotional and physical capacities, is essential. Many of these patients must be taught that they are constitutionally not equipped to live as intensely as they apparently desire.

Physical fatigue may in itself be an important factor in starting the whole chain of psychologic and physiologic disturbances. Vacations, involving freedom from work and responsibilities, may therefore be of greatest benefit.

The presence of emotional instability and of many extragenital "psychosomatic" symptoms necessitates a consideration of the patient's interpersonal relationships at home or at work. These aspects occasionally require the services of a specialist in psychiatry but more commonly seem to be problems of a type

to be handled by any intelligent, sympathetic physician willing to devote his time to their solution.

(4) Endocrine therapy: The approach to the problem by way of the endocrines appears to be an indirect one, aimed not at the actual etiologic factor but against the physiologic mechanism by which the patient is maintained in a state susceptible to the precipitating cause.

The androgens have been reported to give good results, especially in premenstrual tension, apparently because of an inhibiting or neutralizing effect on ovarian function. Dehydration by the elimination of salt from the diet and the administration of ammonium chloride may be beneficial by preventing the excessive retention of fluid, resulting from normal premenstrual estrogen levels acting in the presence of abnormal vascular conditions induced by other factors.

In a small but definite group of patients the symptoms of the congestion syndrome are most pronounced just before the time of the menopause. Breast and pelvic discomforts may be eliminated by retiring the reproductive tract from the wear and tear of active participation in the psychologic problems of life by inducing an early menopause by x-ray. If such patients are carefully selected, the controllable symptoms of the menopause are far more tolerable than those of the congestion syndrome.

(5) Surgery: Surgical treatment should be reserved for cases of long standing and particularly for those in which organic change makes functional improvement improbable. Operative treatment will, therefore, be indicated in only a small fraction of these patients.

Repair of the pelvic floor is a proper procedure when relaxation and a third-degree retroversion with some enlargement of the uterus are present. The value of ligation or excision of broad ligament varicosities in this group is not clear. Presacral nerve resection has an undetermined place in the surgical treatment of these disorders. It may properly be combined with other types of indicated abdominal surgery but much further study of the pelvic sympathetic seems necessary before the value of this operation is established in this condition.

Operations on cystic ovaries should be avoided if possible since the symptomatic results are poor. In cases of persistent pain of long standing, other measures having failed, the surgeon may, however, be forced to some operation. If the pain is unilateral, the removal of one ovary may help. If bilateral, a resection of more than half of each ovary may be tried, but in the cases so treated further surgery seems often to follow.

Hysterectomy is indicated in a few cases of long standing, especially where there is menorrhagia or severe dysmenorrhea with an hypertrophied uterus. This operation is much to be preferred to any more conservative abdominal procedure when the need for preserving the reproductive function is past. The cervix should always be removed when hysterectomy is undertaken.

(6) Prevention: The idea of prophylaxis against congestion has been tentatively and theoretically put forward by a few writers. The concept of prevention is a good one, because undoubtedly this condition tends to persist when once established. Prophylaxis must be based on the early recognition and elimination of the etiologic factors just discussed. In more general terms it requires broad consideration of the strains imposed by present-day living upon women of the childbearing age and the perhaps unwise liberties that modern society is taking with the reproductive process.

General Conclusions

On the basis of a series of 105 cases, a description of the signs and symptoms of chronic hyperemia and vascular congestion has been given, as this condition affects the various parts of the female reproductive tract, the

uterus, cervix, ovaries, parametrium, and breasts. Evidence has been offered that this disorder may be present in only one of these areas and give characteristic local symptoms or may be more or less generalized giving a syndrome derived from the whole reproductive tract.

Evidence has also been given to show that the persistence of this functional vascular condition over many years may result in permanent structural change, consisting principally in proliferation of the connective tissue elements, producing either a fibrosis, as for example in the ovary and parametrium, or an hypertrophy, as for example in the corpus uteri and cervix.

The etiology of this chronic congestion depends on the multiple factors which may produce hyperemia, vascular dilatation, and stasis. Some of these are local and due to anatomic defects, gravity, and inflammation. Others involve several pelvic structures and apparently result from unphysiologic sexual behavior. Still others are quite general and seem to depend on emotional or other psychologic causes.

The treatment of this condition must be based principally on the elimination of the causative factors. These in many instances are determinable from the history or physical examination. As an adjuvant to this approach, various measures involving general or local dehydration may be tried. Finally, in a few cases in which structural change has apparently begun, surgery or ovarian radiation may be needed.

These disorders of the circulation and of the autonomic nervous system in the reproductive organs appear to be the basis of a considerable portion of all minor gynecology and include many conditions now commonly classed as endocrine or inflammatory. Within this field are mastodynia, premenstrual breast engorgement and certain types of "chronic mastitis," uterine congestion and hypertrophy, and many cases of menorrhagia, cervical hypertrophy, and the majority of cases of "endocervicitis," the congested and "cystic ovary," and many of the causes of dyspareunia, dysmenorrhea, and obscure pelvic pain.

The revaluation of gynecologic conditions to include this concept would constitute a major and, the writer believes, an essential revolution in gynecologic thinking.

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VAGINAL DELIVERY FOLLOWING CESAREAN SECTION*

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WHETHER or not a patient with a history of cesarean section should be permitted an attempt at vaginal delivery is controversial. Committed to the dictum "once a cesarean section, always a cesarean section," as advocated by Couvelaire, Breitsen and Marioton, are such modern authorities as Dieckmann, Seeley and Bill. On the other hand, Stander, Waters, Wilson and McLane and Phaneuf permit vaginal delivery in properly selected patients. We hold with the latter group.

The entire decision as to the management of a previously sectioned patient rests on the evaluation of the uterine scar. Experimental investigations and studies of excised cesarean section scars and excised uteri containing such scar have shown that healing is effected by fibroblastic proliferation. According to Schwarz, Paddock and Bostnick:

> ". . . healing process takes place chiefly by proliferation of fibroblasts along the line of incision entering the spaces between the adjacent muscle bundles. As the scar shrinks, this becomes less perceptible and it is difficult to demonstrate the line of incision with ordinary hemotoxylin-eosin stain after two weeks' period. Special stains, namely van Gieson, bring out this differentiation.
>
> ". . . In uteri removed after previous cesarean section, the scar is frequently imperceptible but in many instances, increased connective tissue can be demonstrated. The reason that the scar is imperceptible is due to the marked shrinkage of the newly developed connective tissue and the fact that it branches off in between the muscle bundles along the line of incision. If the suturing has been done well, the muscle edges are in close apposition, which necessitates only a narrow line of healing. As this shrinkage takes place, the normal relationship of smooth muscle and connective tissue, as occurs in normal pattern of the non-injured uterus, is similar."

The strength of such well-healed scar is even greater than the muscle itself. This has been evidenced both experimentally and clinically. Mason and Williams, in 1910, took uterine muscle strips containing cesarean section scar (from guinea-pigs and cats) and subjected them to progressive stretching by means of increasing weights. The site of the resulting rupture was always in the muscle and not in the scar! Clinical reports of rupture through the muscular portion of the gravid uterus while the scar remained intact indicate the relative strength of the two tissues.

Defective scars, however, are weak. From the ideal, firmly united, strong scar described above, there are all gradations to a scar consisting only of peritoneum and decidua. The two principal causes of weak scar are infection and faulty surgical technique. Perfect coaptation may be prevented by leucocytic infiltration associated with more or less tissue necrosis. Wide, weak scar may

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thus result. Technical errors, as improper apposition of tissues, excessively tight suturing, injudicious spacing of sutures, faulty knots, etc., all contribute toward defective scar formation. Cooke, in discussing wound healing, pointed out that tissue necrosis resulting from excessively tight suturing was probably a greater factor in the production of weak scar than were the infection or failure to close in layers.

Presumed causes of weak scar, such as the location of the uterine incision and the character of suture material are disputed. English workers seem to prefer classical section. Wyse of Germany, in 1905, stated that a bad cervical scar was worse than a fundal scar because of the marked thinning of the lower uterine segment. American obstetricians generally favor the low segment approach. Furthermore, Waters and Phaneuf believe that a transverse, low cervical incision is safer than a vertical one. Despite these various preferences, the critical observations of Falls, Schuman, and others revealed very little difference in results of the two types of cesarean section when comparable cases were analyzed.

Regarding suture material, opinions are also divided. Price, Kennedy, Babcock, and Potter advocate the use of nonabsorbable, nonirritating suture materials but the excellent results experienced by the user of "catgut technique" indicate that wound healing depends less on the material than on the method. Supporting this latter view is the work of Bowers, Burns, and Mengle with fine 5-0 chromic catgut suture in surgery of the gastroenteric tract, the biliary tract, in suturing of dura, tendon, nerve, and fascia and in surgery of children.

Other factors advanced as predisposing or contributing to weak scar are the influence of placental implantation over the scar and the effect of overdistention on the scar. In a well-healed scar, neither factors affect the scar in any way. In a defective scar, however, chorionic invasion may occur and accentuate the weakness of the scar or the overdistention may result in disruption of the scar.

The argument that a routine repeat section should be done as prophylaxis against uterine rupture is not absolutely valid. Review of literature will reveal many instances of rupture occurring before term. Swift reported a case of spontaneous rupture at three months' gestation following a classical section and an abdominal pregnancy. LaMariana, in 1932, found 24 cases rupturing before term—7 cases ruptured in the seventh month of pregnancy! (Table I.) A prophylactic section, even when the rare first trimester rupture is eliminated, must have been done by the seventh month if all of the uterine ruptures were to have been prevented—an obviously absurd statement, as was pointed out by Karl Wilson in 1926.

TABLE I. TIME OF UTERINE RUPTURE
REVIEW OF LITERATURE BY PETER LAMARIANA (1933)

Full term	110
Eight months	12
Seven months	7
Eight and one-half months	5
Eleven months	1
Total	135

In the light of above knowledge regarding wound healing, strength of well-healed cesarean scar, and the causes of weak scar, a trial of labor does not seem contraindicated in selected patients. With the view toward proper evaluation of the risk involved, the charts of all patients delivered at Lewis Memorial Maternity Hospital between Jan. 1, 1931, and Nov. 1, 1947, were reviewed. The general statistical data are presented in Table II. The total number of patients with a history of cesarean section (or sections), whether performed at Lewis Memorial Maternity Hospital or elsewhere, was 385. Of this 385, 106 were subjected to one or more repeat section and 51 were successfully delivered via the vaginal route (Table III). Thus, 32.4 per cent of the 157 patients with a history of section at the preceding pregnancy were so delivered. Of the 51 patients, 45 were delivered of their first pregnancy following the cesarean section at the Lewis Memorial Maternity Hospital (as shown in Tables V and VI). There were 88 deliveries in the 51 patients. In Table VII is shown the distribution according to the number of deliveries subsequent to the section, while the number and the types of deliveries are shown in Table VIII.

TABLE II. GENERAL STATISTICS, JAN. 1, 1931, TO NOV. 1, 1947

Total number of patients registered			23,989
Total number of deliveries			31,368
Total number of cesarean sections			466
Classical type	291		
Low cervical type	165		
		456	
Porro type		5	
Posthumous type		5	
Total number of ruptured uteri			5
With section history		3	
Without section history		2	
Abdominal pregnancy			1
Pubiotomies			5
Craniotomy			1
Maternal deaths			53
Following section		11	
Without section		42	

TABLE III. NUMBER OF SECTIONED PATIENTS (POSTHUMOUS SECTIONS NOT INCLUDED)

Total number with history of cesarean section		385
1 section (including Porro in 4)	279 (72.5 per cent)	
2 sections (including Porro in 1)	75 (19.5 per cent)*	
3 sections	24 (6.2 per cent)	
4 sections	5 (1.3 per cent)	
5 sections	2 (0.5 per cent)	
Total number delivering vaginally after a section or 13.2 per cent of all patients with section or 32.4 per cent of all patients with *previous* section.		51

*Includes 2 patients with vaginal deliveries between first and second section and 3 cases by ruptured uteri.

TABLE IV. PARITY AT TIME OF FIRST SECTION (POSTHUMOUS SECTIONS NOT INCLUDED)

Para	i	ii	iii	iv	v	vi	vii	viii	ix	x
Number	260	54	25	19	10	7	5	2	1	2
Per cent	67.5	14.0	6.5	4.9	2.6	1.8	1.3	0.5	0.?	0.5

TABLE V. PLACE OF SECTION AND VAGINAL DELIVERY

Section elsewhere, first vaginal delivery elsewhere	6
Section elsewhere, first vaginal delivery at L. M. M. H.	15
Section and first vaginal delivery at L.M.M.H.	30
Total	51

TABLE VI. PARITY AT TIME OF SECTION

	i	ii	iii	iv	v
Section elsewhere, first vaginal delivery elsewhere	5	1	–	–	–
Section elsewhere, first vaginal delivery at Lewis Memorial Maternity Hospital	15	–	–	–	–
Section and first vaginal delivery at Lewis Memorial Maternity Hospital	17	7	3	1	2
Total	37	8	3	1	2

TABLE VII. NUMBER OF DELIVERIES FOLLOWING SECTION

	1	2	3	4	5	Total
Section and first vaginal delivery elsewhere	–	2	2	1*	1	6
Section elsewhere, first vaginal delivery at Lewis Memorial Maternity Hospital	11	1	3†	–	–	15
Section and first vaginal delivery at Lewis Memorial Maternity Hospital	17	10‡	1	2	–	20
Total	28	13	6	3	1	51

*Section—forceps—forceps—pubiotomy—spontaneous.
†Section—version and extraction—forceps—section (1 case).
‡Section—forceps and version and extraction for twins—low cervical section (1 case).

TABLE VIII. TYPES OF DELIVERIES FOLLOWING SECTION

	1ST	2ND	3RD	4TH	5TH	TOTAL
Spontaneous	28	17	8	4	1	58
Forceps:						
Not specified	2	2	–	–	–	4
Low	16	–	–	–	–	16
Mid	2	–	–	–	–	2
Breech extractions	2	2	–	–	–	4
Version and extraction	1	–	–	–	–	1
Pubiotomy	–	–	1	–	–	1
Subsequent section	–	1	1	–	–	2
Total	51	22	10	4	1	88
Twins	3	1	1	–	–	5

Since 6 of the 51 patients had both the cesarean section and the first subsequent vaginal delivery performed elsewhere, only the remaining 45 patients had "trial of labor" which could be evaluated. Of these 45 patients, 31 had had the operation at the time of first pregnancy (therefore, as a primipara and to be referred to as primipara section group) and 14, after the first parity (therefore, as a multipara and to be referred to as multipara section group). The duration of labor for the first vaginal delivery following a section for the two types of patients is shown in Table IX. Comparative birth weight studies (Table X) reveal that 17 primiparous section and 6 multiparous section patients were delivered of a larger infant at the subsequent vaginal delivery than at the section delivery. This is important from two standpoints: first, that the clinical impression of disproportion may be erroneous, and, second, that overdistention per se does not cause weak scar as has been discussed already. Reference to Table XI shows 9 patients sectioned for "disproportion." Five of such patients had larger infants at the subsequent vaginal delivery and two additional patients had twins with their first pregnancy following the section.

TABLE IX. DURATION OF FIRST STAGE OF LABOR IN FIRST VAGINAL DELIVERY AFTER SECTION

SECTION AT: (HOURS)	0-2	2-4	4-6	6-9	9-12	12-18	18-24	24-36	OVER 36	MAXIMUM	MINIMUM
Primiparas	1	5	6	3	8	3	1	2	2	56 hours 15 minutes	1 hour 21 minutes
Multiparas	0	6	2	2	1	2	1	0	0	23 hours 9 minutes	2 hours 35 minutes

TABLE X. CASES WITH GREATER BIRTH WEIGHT AT VAGINAL DELIVERY THAN AT SECTION DELIVERY

SECTION AT:	0-7 OZ.	8-15 OZ.	1-2 LB.	2-3 LB.	3-4 LB.	4-5 LB.	OVER 5 LB.	TWINS
Primiparas	3	3	7	0	2	1	1	4
Multiparas	2	0	3	1	0	0	0	1

TABLE XI. INDICATIONS FOR THE SECTION

Placenta previa		11
Abruptio placentae		4
Toxemias of pregnancy		6
Eclampsia	1	
Pre-eclampsia	4	
"Toxemia"	1	
Toxemia and antepartum bleeding		1
Disproportion		9
Prolonged labor		4
"Weak" indications		4
Desire for live child	1	
Double vagina	1	
Old 3° laceration	1	
Compound presentation, prolapsed foot	1	
Not determinable (sectioned elsewhere)		12
Total		51

The type of cesarean section preceding the vaginal delivery is shown in Table XII. Since 1942, the low cervical section has been employed almost exclusively and the transverse incision generally favored over the vertical one. The number of successful vaginal deliveries following the classical section, however, seem to indicate that the site of incision does not contraindicate "a trial of labor." There have been, however, three instances of uterine rupture in patients with history of section. Because of their importance, the three cases are abstracted here:

TABLE XII. TYPES OF SECTION PRECEDING VAGINAL DELIVERY

Sectioned elsewhere (probably classical)	22	46
Classical section at Lewis Memorial Maternity Hospital	24	
Low cervical section at Lewis Memorial Maternity Hospital		5
Transverse uterine incision	2	
Vertical uterine incision	3	

CASE 1.—No. 8161, 40 years old, para i, gravida ii. First pregnancy in 1934 was terminated at the 30th week by classical section for "eclampsia." Fetal weight was 3 pounds 13 ounces. Closure was in 4 layers. Postoperative course was uneventful and afebrile.

With her second pregnancy, 1936, she was admitted 13 days prior to the expected date of confinement, in a state of shock. The accompanying relatives stated that the patient suffered sudden onset of pain which rapidly became continuous in nature. She was treated for her shock. After two days, she was operated upon and found to have a ruptured uterus with complete extrusion of the intact placenta and bag of waters out into the peritoneal cavity. The infant was dead. The uterus was well contracted but was removed subtotally. The convalescence was uneventful and afebrile.

CASE 2.—No. 15,521, 23 years old, para i, gravida ii. First pregnancy occurred in 1937 and she was delivered by cesarean section at an outside hospital. The indication was not given but the fetal birth weight was 9 pounds.

With her second pregnancy, 1939, she was admitted at term with a history of onset of mild labor. In view of our finding of "justo minor" pelvis with the false promontory

being reached at 11.0 cm. and a history of preceding section delivery elsewhere, a repeat section was performed. The uterus was found ruptured. The intact bag of waters was protruding through the rent. A live 7 pound, 6 ounce infant was delivered. The edges of the ruptured wound were found completely scarred and there was no bleeding. The scarred edges were excised and the uterus was closed in 4 layers. The postoperative course was completely afebrile and uneventful.

CASE 3.—No. 22,537, 32 years old, para i, gravida ii, with a cesarean section delivery of a 9-pound stillbirth with the first pregnancy in 1945. The operation was done at another hospital but the patient stated that there had been preoperative hemorrhage.

With her second pregnancy, in 1947, she was admitted 10 days before the expected date of confinement with a history of labor pain and a spontaneous rupture of the bag of waters. Preoperative diagnosis of "impending rupture of the uterus" was made on the basis of strong labor pains and marked tenderness over the former incision site. Laparotomy revealed an early rupture of the lower segment, although it was still covered by an intact peritoneum. A live term fetus was delivered and the uterine rent closed. The postoperative course was uneventful and afebrile.

Thus, in the 3 cases of ruptured uteri, there was no maternal mortality or "morbidity" and the fetal salvage was 67 per cent.

The fetal outcome in the 86 successful vaginal deliveries were: 5 sets of twins, 3 fetal deaths, and one 3 pound, 3 ounce, premature infant who survived! Of the 3 deaths, one infant was delivered vaginally *because of the diagnosis of intrauterine death* which occurred 5 days prior to the scheduled date for the repeat section. The second fetal death case was a 5 pound, 2 ounce hydrops fetalis delivered 8 weeks prematurely. This mother had been sectioned at the preceding pregnancy, which was her fifth, ten weeks before the expected date of confinement because of bleeding, only to have a 3 pound, 6 ounce fetal hydrops. The third fetal fatality occurred in a ten weeks premature 3 pound, 1½ ounce infant who survived only ten hours. The section delivery preceding this delivery in this mother had been performed elsewhere and the weight in that fetus had been 3 pounds. Thus all three deaths were nonpreventable.

TABLE XIII. BIRTH WEIGHTS AT VAGINAL DELIVERIES FOLLOWING SECTION DELIVERY

3-4 lb.	4-5 lb.	5-6 lb.	6-7 lb.	7-8 lb.	8-9 lb.	9-10 lb.	10-11 lb.	Twins
2	0	2	13	29	22	10	3	5

Discussion

The proponents of routine repeat section will probably point out that an incidence of three ruptures in 157 patients, particularly of the silent kind illustrated by Case 2, not only justify *but indicate* prophylactic section. They will state that it is impossible to determine which patient is going to suffer a ruptured uterus. Cases of rupture occurring after an interval of vaginal delivery are cited as evidence. Yet, the same worker will agree that an attempt at vaginal delivery is indicated when the fetus is known to be dead. This seems inconsistent. The maternal risk in a ruptured uterus is the same regardless of the state of the fetus.

The mortality following a rupture of cesarean scar is estimated to be around 10 to 15 per cent. Burkons reported an incidence of 11 per cent and stated that the obstetrician who favors vaginal delivery following a section assumes less risk than if he routinely resectioned all patients. His logic was as follows: the average incidence of rupture following classical section is 4 per cent, of this, 11 per cent may be expected to die—an incidence of 0.44 per cent

of the original number, whereas, the basic mortality in resection cases as reported by Skeel and Jordan, quoting Burkons, is 1 to 2 per cent. McLane found no uterine rupture and no maternal mortality in his series of 43 cases. Duckering, of Stander's clinic, reported eight cases of ruptured uteri in previously sectioned patients with no maternal fatality. She attributes this to the careful observation and prompt treatment. We had no mortality in our three ruptured uteri.

There is little doubt that the maternal risk in a rupture through the old section scar is less than that resulting from ruptured uteri occurring in patients without such scar. Burkons found shock present in only two of the eighteen rupture patients with section scar while shock was the prominent condition in 23 of the 27 uterine ruptures in patients without the scar. It seems logical, therefore, that certain conditions indicate a "trial of labor" as the management of choice in certain select patients. This management, of course, must be under an experienced, well-qualified obstetrician at a hospital equipped to meet all emergencies. These conditions are:

1. *Early Engagement of the Presenting Parts.*—This condition facilitates evaluation of the cervical status, particularly during labor. In 10 of the 45 patients, engagement occurred three to five weeks before the onset of labor.

2. *History of Vaginal Deliveries Preceding the Section Delivery.*—The comparatively lighter and shorter labor of each succeeding pregnancy indicates the relative ease of effacement and dilatation of the cervix. The greater the number of vaginal deliveries preceding the section, the easier and shorter may be the expected labor. Table IX confirms this impression.

3. *Diagnosis of Death or Monstrosity in Utero.*—Uniformity of opinion is approached regarding this indication. In one of our patients scheduled to have repeat section on basis of previous section by unknown operator indication, intrauterine fetal death was diagnosed five days prior to the date of scheduled operation. She was, therefore, permitted to go into spontaneous labor and delivered of a 7 pound 11 ounce macerated stillbirth after twelve hours of labor.

4. *Reasonable Assurance of Well-Healed Scar.*—As has been discussed, a well-healed, strong scar may be reasonably expected when the surgical technique is known to be good and the postoperative course uneventful and afebrile (i.e., free of infection). This, plus the absence of the original indication for the section, will indicate a trial of labor.

The significance of successful vaginal delivery subsequent to a section delivery is obvious. Once a patient has had such a delivery, the contraindication to a careful "trial of labor" is almost completely removed. Even the most ardent advocate of repeat section will concede that an attempt is justifiable with all subsequent pregnancies (for that patient). This becomes of greatest importance when it is realized that the majority of the first sections are performed on primiparous patients (Tables IV and VI), how often operations are done on erroneous indications (Table XI) and the fact that some authorities attach so much danger to repeated sections that routine sterilization is practiced after the second or third cesarean section! A successful vaginal delivery, then, at least partly corrects what Kennedy refers to as "tragedies of the uterine incision incident to the cesarean section."

The danger of uterine rupture occurring during labor is admitted. We have had three in our 157 patients. Furthermore, a successful vaginal delivery does not guarantee against future rupture. Fava, Casagrand, and others have

reported uterine ruptures occurring following cesarean section but with normal deliveries in the interval between. Dieckmann mentions a case following an interval of two vaginal deliveries. On the other hand, Mason and Williams (1910) and Lemeland and Lacomme (1933) have reported cases with vaginal deliveries following three preceding sections. In general, the greater the number of vaginal deliveries, the less likelihood is there of rupture. The danger, however, is always present, so that every gravida with a history of casearean section must be observed carefully at all times and particularly in the last trimester. All complaints of vague abdominal pain and tenderness must be carefully evaluated so that when rupture does occur or can be anticipated, prompt appropriate measures may be taken (as the treatment of shock in our first case, and the prompt intervention in the third case). Under such regime, the maternal risk may be kept at a minimum consistent with the justification for an attempt at vaginal delivery.

Summary

The literature has been reviewed regarding the wound healing, the causes of weak scar, and the risks involved in ruptured uteri following cesarean section. There seems to be definite indication for an attempt vaginal delivery under certain circumstances as outlined.

The 18 years' survey at the Lewis Memorial Maternity Hospital revealed that 51 (or 32.4 per cent) of the 157 patients with a history of cesarean section were successfully delivered via the vaginal route. The incidence of ruptured uteri was three (or 1.8 per cent) *but not in the ones subjected to a trial of labor.* There was no maternal mortality or "morbidity" following the rupture. The fetal salvage was 67 per cent. In 37 out of the 51 vaginal delivery patients, the cesarean section had been done at the time of primiparity; in the remaining 14, one to four vaginal deliveries preceded the section. The maximum and minimum duration of the first stage of labor in the first vaginal delivery following the section were 56 hours 15 minutes and 1 hour, 21 minutes, respectively, in patients sectioned as primiparas; and 23 hours, 9 minutes, and 2 hours, 35 minutes, respectively, for patients sectioned as multiparas. Seventeen primiparous section patients and six multiparous section patients were delivered of a larger infant at the subsequent vaginal delivery than the original section delivery. There were 86 vaginal deliveries following the 51 section deliveries. The fetal deaths were 3—all nonpreventable (an intrauterine death before labor, an 8-weeks-premature hydrops fetalis and 10-weeks- premature 3 pound, 1½ ounce infant).

The danger of ruptured uteri complicating an attempt vaginal delivery is admitted and discussed.

Conclusion

A trial of labor seems indicated as the management of choice in a certain number of properly evaluated patients when supervised by a competent obstetrician in a hospital equipped to meet all emergencies. The significance of successful vaginal delivery following a cesarean section has been stressed. Thus, the old dictum "Once a cesarean section, always a cesarean section" should be changed to "Once a cesarean section, NOT NECESSARILY always a cesarean section."

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Discussion

DR. R. M. GRIER.—The authors are to be commended for their courage in re-evaluating the risks involved in allowing vaginal delivery after a previous cesarean section. There are too few comparable reports in the literature. They have given us a very thorough study of the arguments for and against such management. They have considered for this study 157 women; though they have had many more cesarean operations at the Lewis Memorial Maternity Hospital, I assume, these are all that were subsequently delivered by them. Of these, less than a third, or 51, were given trial labor. Since six of these were delivered elsewhere, they have not been considered. This leaves 45 women who have been observed by the authors. Twenty-eight were delivered once vaginally. Seventeen of the twenty-eight had subsequent pregnancies and two of these were delivered by section. Therefore, only 15 women were delivered more than twice in this manner. Just four more infants were born than would have been possible had these women been sterilized following a third cesarean. It has been our rule to recommend interruption of the tubes following a third operation. I have not yet lost a patient following repeat cesarean, but my series of cases is relatively

small. The authors do not state their results in the 106 patients who had subsequent sections. A comparison would be interesting. Since sterilization has not been permitted in their hospital, I should think they would have a fairly large series with more than three repeat sections. What are their results in these cases?

When one eliminates those patients (1) who have had cesarean sections for frank disproportion or after a test of labor; (2) those who are known to have had a febrile postoperative course; (3) those who were operated upon elsewhere, for whatever cause; (4) those who were operated upon through the site of a low-lying placenta; (5) and those who have uterine myomas or other pelvic tumors, the number who will be eligible for a trial labor will be relatively small.

Too many of us have arbitrarily taken the easy way and done repeat sections without considering vaginal delivery. It has been our custom to operate on these women about a week before their expected date of confinement, and if they go into labor spontaneously before this time, we hurry them to the operating room. Thus, our women have not been permitted a trial labor. Personally, I have delivered only two women vaginally after cesarean section. One of these, a para ii, entered the hospital in labor with a well-engaged head, a soft cervix dilated to 5 cm. She was allowed to continue in labor and delivered easily in a few hours with the aid of outlet forceps. The other had delivered twice vaginally, prior to cesarean section for central placenta previa. She refused a second section and delivered successfully from below. I believe that if more of my patients were given a trial labor, many of them would accomplish the same thing.

From the authors' experience, I agree that the old dictum, "Once a cesarean, always a cesarean," is not necessarily correct. With careful selection of cases and careful observation in a well-equipped maternity hospital, it seems that a trial labor is occasionally justified. The authors speak of "trial labor" and I assume from this that not all of their women are allowed to finish labor. How many were eventually delivered by cesarean after a trial? I would still be afraid to allow a woman to continue through labor when progress stops for whatever reason. They have only mentioned watching for signs of rupture through the previous site of the uterine incision as an indication for section. Should some dilatation and effacement, and engagement, be found on examination prior to the onset of labor, then the outlook for vaginal delivery should be anticipated as favorable. Should a woman who has never previously dilated her cervix, enter the hospital in labor, with no dilatation, no effacement, and no engagement, it would be against my judgment to allow trial labor for too long.

DR. HUGO BAUM.—As a general statement, "once a cesarean section, not necessarily always a cesarean section" does not require debate. Probably every clinic has had the experience of admitting an obstetric patient, previously sectioned, but this time presenting hreself near the end of the second stage of a precipitous labor and easily delivering through the birth canal. Drs. Schmitz and Baba have shown that in a well-equipped, well-staffed hospital many more previously sectioned patients, carefully selected, can be delivered through the birth canal.

Rightly, all papers on vaginal delivery following cesarean section emphasize the condition of the uterine scar. Wound healing naturally depends upon the care with which margins of an incision are approximated and upon the absence of infection. However, there is another factor not easily evaluated but equally, if not more, important which has not been mentioned and is usually not considered. This factor might be termed the general nutritional health status of the patient. This factor probably accounts for defective scars seen in those patients who have received the best of surgical technique and whose convalescences have been afebrile.

Since the ultimate factor determining whether or not a patient, one previously sectioned, can subsequently be delivered through the birth canal depends upon the uterine scar, it is unfortunate that we are unable, as on an automobile, to lift the hood and inspect the scar. Instead, we must depend upon unreliable palpation and upon the subjective symptoms of tenderness and pain over the site of the previous incision. Individual susceptibility to pain and anxiety are not measurable and thus our estimation of the scar can only be an impression.

I, personally, have watched selected patients, during trials of labor, develop symptoms suggestive of thin scars, only at section to find a firm union which probably would have withstood labor, and again have observed in other patients, at the time of repeat section, scars which were so thin that definite diastasis existed, which gave no symptoms and probably would not have given symptoms unless the patients had been allowed to progress in labor and had ruptured the uterus.

In the five years, 1942 through 1946, 6,545 patients have been delivered at the Presbyterian Hospital of Chicago. There have been 273 sections, an incidence of 4.1 per cent; of these, 115 were repeat sections. There has been one cesarean section death, a primigravida, giving a mortality rate of 0.36 per cent. Of the 115 repeat sections, there was one patient who, at the time of her second cesarean, had beginning separation of the lower end of the uterine scar and a small hematoma forming beneath the bladder reflection. Four patients of the 6,545 had vaginal deliveries following previous cesarean section. Three of these had their first pregnancy delivered by cesarean section and their labors were typically primiparous. The fourth had first a normal delivery, then a cesarean section for placenta previa, and then a vaginal delivery. All four had the second stage terminated by low forceps. In the report read tonight, there is a record of one patient, not delivered at Lewis Memorial Hospital, on whom a pubiotomy was performed to permit vaginal delivery following cesarean section. Such a procedure cannot be justified today. Version and extraction delivery of a twin pregnancy is not without danger of a ruptured uterus even when the babies are small.

I agree "once a cesarean section, not necessarily always a cesarean section," but I hesitate to consider the tragedies which might result in hospitals where vaginal deliveries following cesarean section are attempted, which are not prepared to make careful selection of patients to be given a trial of labor and are not prepared to cope with the ruptured uteri which they will encounter. This next statement may seem unnecessary, but maternal deaths prove otherwise. Having compatible blood available, ready for administration, is as important as having the operating room ready to handle the emergency, for treatment of accompanying shock must precede surgery.

DR. W. J. DIECKMANN.—I do not feel that the authors have offered any positive proof that vaginal delivery, after cesarean section, is safer for mother and baby than a repeat elective section.

They state that if you practice repeat cesarean section, then you must perform the operation at 30 weeks because ruptures have occurred at this time. This is very rare and, furthermore, uteri have ruptured at 12 weeks. In other words, the authors seem to suggest that these women should not have become pregnant.

They also state that craniotomy for the dead baby is not desirable. Perhaps they are correct, but experience indicates that many uteri rupture during the second stage. We try to prevent this by craniotomy at 7 to 8 cm. dilatation. We dislike subjecting the patient to the increased risk, small as it is, of section for a dead baby.

I question the statement that scar tissue is stronger than the original tissue. I do not believe that the maternal risk is less in rupture through the cesarean scar than that involved in rupture without a scar.

Only three ruptures of the uterus in 157 patients with cesarean scars in 18 years, and no maternal mortality or morbidity in these three patients is an excellent record.

We have a high morbidity in all of our uterine ruptures where fetus and/or placenta is extruded into the abdomen. We have had no mortality from rupture in over 740 patients who have had a previous section. I would certainly not want to be responsible for a test of labor in one patient per week (our average) with a uterine scar.

Vaginal delivery after cesarean section carries an increased risk. The reports of rupture of the uterus after cesarean section from the obstetric services at Harvard, Cornell, Hopkins, Western Reserve, Tulane, Loyola University, and our service reveal a maternal mortality of from none to 42 per cent and a fetal mortality as high as 100 per cent. All services report some deaths. Delfs, reporting the Hopkins' statistics, states that the risk of

maternal mortality after cesarean section was 0.4 per cent but that their maternal mortality from cesarean section is 0.9 per cent. Therefore it would be better to subject the patient to a test of labor even though the uterus might rupture. Obviously these statistics are misleading.

The authors report vaginal delivery of 51 out of a possible 157 patients who had had previous cesarean section. If vaginal delivery can be carried out so safely, why were not the other 106 patients also subjected to vaginal delivery? These statistics have been collected over a period of 18 years, obviously *after* the deliveries had occurred. Are no repeat sections now performed by the authors? Would they want their wives or daughters to have a test labor after cesarean section, and if so, would they be willing for them to labor 23 to 56 hours? It is not the doctor's life they are gambling with, it is the life of the patient and her baby and are we justified in such a gamble? No one can foretell which uterus will rupture. There are no characteristic symptoms and signs of imminent rupture of the uterus.

There is an irreducible mortality associated with reproduction. We have had over 49,000 deliveries (1,000 Gm. or more) in the hospital from 1931 to June 30, 1947, with a total uncorrected maternal mortality of 70 or 0.14 per cent. If we correct for approximately two-thirds of the deaths which had preventable factors, the maternal mortality is then approximately 0.05 per cent. We have in this same period performed 2,333 cesarean sections with a total mortality of 11, or 0.47 per cent; obviously higher, but many more of these women would have died with vaginal delivery. We have included one woman who died at home three months after delivery from an abdominal abscess resulting from the operation. Of the 11 deaths, two were due to tuberculous meningitis, one was on a moribund eclamptic, six were probably preventable and one possibly had preventable factors. In other words, there was only one nonavoidable death, due to pulmonary embolism. Since July 1, 1942, we have performed over 860 consecutive cesarean sections, without a single maternal death. We have had some seriously sick patients who required intensive treatment but they have survived and have not been left crippled. We believe the patient is entitled to that treatment which yields the lowest maternal and fetal mortality, morbidity, and lack of injury to soft parts.

Our uncorrected stillbirth and neonatal mortality for all deliveries, from 1941 to 1946, of fetuses weighing 1,000 Gm. or more, is 2.5 per cent. The corrected mortality for all vaginal deliveries, from 1941 to 1943, of fetuses weighing 1,500 Gm. and more due to the delivery, per se, is 0.7 per cent. I am positive that our corrected fetal mortality for elective cesarean section at 37 or more weeks' gestation is less than 0.3 per cent. Compare this mortality with that for vaginal delivery and with that (33 to 100 per cent) for a possible rupture of the uterus. There is no question but that the baby has a better chance by an elective cesarean section than by vaginal delivery.

I think the conclusion of the authors that vaginal delivery after cesarean section is a safe procedure, even though they carried it out in only a third of their cases, is wrong and dangerous because doctors will try it and will have an increased mortality. There should be less criticism of the doctor who performs an occasional questionably unnecessary cesarean section and increased caustic criticism of the doctor who delivers vaginally when he should have performed a cesarean section or who waits too long before performing the operation and ends with either a dead baby, a dead mother, or both. There is no excuse for this type of obstetrics. It belongs to the past.

Once a cesarean section, always a cesarean section, should be one of the doctor's commandments. Another commandment is: cesarean section and cesarean-hysterectomy are elective procedures for the treatment of selected cases and not a last-minute attempt to empty the uterus when vaginal delivery has failed.

DR. J. P. GREENHILL.—About 25 years ago I wrote a short paper with the title, "Once a Cesarean Section, Always a Cesarean Section, an Untruth." I wrote it because in one year four women were delivered vaginally at the Chicago Lying-in Hospital who had had previous cesarean sections because of disproportion. Each of the four babies born through the vagina weighed more than the baby delivered by cesarean section.

Dr. Baba mentioned the work of Dr. Schwarz on the regeneration of scars following classical cesarean section. In 1929, Bloom and I reported a study of the scars which followed cervical cesarean section. It was amazing what some scars withstood because in some instances the scars were extremely thin and irregular, and yet they did not rupture during active labor. It did not make much difference who the operator was. There seemed to be some evidence that the better scars were the ones closed with interrupted sutures.

I agree with Dr. Dieckmann concerning the wisdom of performing repeat cesarean sections in nearly all cases, because we cannot be certain that a rupture will not occur during labor. After classic cesarean section, there is the decided risk of rupture of the uterus during pregnancy, in addition to the danger of rupture during labor.

DR. SCHMITZ (Closing).—Relative to the remarks of Dr. Grier, I think that the reason there were any repeat sections in this relatively small number of cases which he alluded to was due to the fact that there was definite indication for repeat section in that group. Therefore, there would be fewer cases that we thought were ideal for attempt at vaginal delivery. All these patients, as we stated in the paper, came to the hospital with the head well down in the pelvis, the cervix effaced and dilated. A few cases of prolonged labor were found. We have all seen patients who have come in with effacement and partially dilated cervix, giving us the hope of a very rapid and uncomplicated delivery, then developing a uterine inertia from weak and unsatisfactory pains lasting many hours, during which time we spend many unhappy minutes watching them and fearing the possibility of rupture. From our observations in this group of patients, we feel that by carefully watching the patient, sedating the patient, and being ready at the least indication to do a repeat cesarean section that we have not added any risk to the mother.

The pubiotomy that was done was done many years ago, as were the version and extraction and some of the other procedures which we would certainly not condone. Inasmuch as we viewed the records of the hospital since its inception we thought it only fair that we include these in the study, so that the conclusion would be either for or against having them done. In the remaining patients who had repeat sections, and this was published in our study on cesarean section, there were no deaths.

I cannot differ too much with Dr. Dieckmann. I respect his experience and his judgment, but it did seem to us in watching these cases that if the conditions which we have set forth were present there was no greater risk for the mother in permitting her to deliver from below. We merely tried to bring out, in quoting other statistics, that rupture could occur at the time of elective cesarean section. If we were to avoid all danger, then we must do our sections shortly after or at time of term. I do not believe this study is going to influence many people to attempt delivery from below. I believe it is something for us to discuss in a meeting of this type. We will try to evaluate it further and if, in the future, our results are not so good, we will be very willing to admit it and to agree with Dr. Dieckmann.

THE EFFECTS OF VARIOUS ESTROGENIC PREPARATIONS

II. Changes in the Vaginal Mucosa and General Status of Climacteric Women Following the Injection of Aqueous Suspensions of Estrone and Estradiol

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THE standardization of estrogenic material for use in human beings exists as a problem of no mean proportions. Methods of assay have varied from observer to observer and from manufacturer to manufacturer. These statements are applicable to the two active forms of ovarian follicular hormone known to be physiologically present in man, estradiol and estrone. Despite the fact that both of these have been isolated in pure form and carefully assayed in small laboratory animals, attempts to express the dosage of one in terms of the other, even on a weight-for weight basis, have resulted in widely variant recommendations regarding their use in human beings.

In order to avoid some of the difficulties into which any clinical comparison may fall, the present study was planned so that:

1. Estradiol and estrone were tested at two levels of dosage for each individual subject.
2. Water, as a menstruum for estrogenic material, could be appraised.
3. Subjects were selected whose past record was well known or had been followed for a considerable period of time.
4. An appraisal of the influence of the estrogen upon clinical manifestations could be made separately and independently of the changes taking place in the vaginal smear.
5. No regular sequence of treatment was followed; that is, in one subject, one preparation and dosage level were used first, in a second, the order might be reversed, and so forth; except for the fact that estradiol in 1 mg. doses was never used first.
6. The priming effects of previous doses of estrogen were minimized.

Material and Methods

A. *Preparations.*—

The four preparations employed in this study were aqueous suspensions containing per c.c. 2 mg. estrone, and 0.5 mg. estradiol, administered in 1 c.c. and 2 c.c. doses, respectively.* Watery suspensions were employed in the belief that the insoluble state of the estrogenic material might make for a slower absorption and more prolonged effect. In a few instances, the site of the injection of the watery suspension was sore, as compared with the absence of distress when oily preparations were used.

*We gratefully acknowledge our indebtedness to Dr. E. W. Henderson, of the Schering Corporation, Bloomfield, N. J., for the preparations used in this study.

In so far as possible, each subject was utilized in the testing of each preparation, thus serving as her own control. In order to minimize the priming effect of preceding doses, an interval of three weeks or more was allowed to elapse between injections. A total of 80 such tests were made. The procedures relating to the taking of vaginal smears prior to therapy and daily thereafter, the staining of the smears, and the method of tabulating the observations have been previously described.[1] Approximately 1,100 vaginal smears have been examined in following the effects of 80 injections of hormone.

B. *Subjects.*—

Twenty-three women with complaints which were climacteric in character have been treated successively with one or more of the four estrogenic preparations. Fifteen of these women, ranging from 24 to 53 years of age, had been surgically castrated and four, from 48 to 54 years old, were menopausal.* One woman, 61 years old, although many years postmenopausal, had climacteric* symptoms. Another patient, aged 22 years, had been castrated by roentgen ray. One 46-year-old subject (3a) was menstruating regularly and another, aged 37 (18a), had had a hysterectomy and unilateral oophorectomy. Control smears on 3a showed a "normal" cyclic vaginal secretion. Case 18a was studied for three months prior to initiation of therapy. Smears taken daily over this period of time showed the typical changes observed in smears of normally menstruating women, with an ovulatory peak occurring on the fifteenth day of the cycle. Objective changes in these two cases could not be properly evaluated and are classified as questionable throughout.

In other isolated instances, data regarding alterations in the vaginal smear have been tabulated with reservations. Included here are some of the observations on patients 1a and 14a, who, following injection of 4 mg. estrone and 1 mg. estradiol, respectively, showed cytologic alterations too slight to grade and patients 7a, 14a, and 16a, whose smears, at the time of administration of 1 mg. estradiol, 4 mg. estrone, and 0.5 mg. estradiol, respectively, indicated residual hormonal activity. This was attributed by us to the preceding injections of estrogen in patients 7a and 16a and probably to endogenous hormone formation in 14a, who menstruated for three days about two weeks after her third injection, i.e., approximately sixteen days prior to the dose in question. Similarly, patient 1a had an apparently "normal" menstrual period ten days after an injection of 1 mg. estradiol. Smears prior to flow showed a marked estrogenic effect and observations made at this time are difficult to evaluate. Six weeks later, a second injection of 1 mg. estradiol was administered and daily smears thereafter did not alter from the controls.

C. *Evaluation of Symptomatic Relief.*—

The most frequent complaints encountered in this group of patients were nervousness, trembling, headaches, hot flashes, dizziness, palpitations, and sweating. A few women complained of fatigue. The difficulties attendant upon the initial grading of these symptoms are apparent. The attempt has been made, however, to evaluate the degree of relief reported by the individual patients following each injection. The subjective response to the therapy has been qualitatively estimated (Table IV).

*In the sense used throughout this report, the term menopausal has been used to designate all subjects whose menstruation had ceased within 3 years of the date of beginning the injections. In contradistinction, the climacterium refers to the syndrome of glandular imbalance in which ovarian disturbances play a major role and which commonly arises at the menopause, but may appear at any time in life from puberty onward.

Result

A. *Following an Injection of 2 Mg. of Estrone.—*

1. *Objective* (Tables I and II, Fig. 1): In seven of twenty patients who received injections of 2 mg. estrone, there was no significant alteration of the vaginal secretion; in two the results were questionable. Eleven subjects showed definitive changes occurring between the 72nd and 168th hour following administration of the estrogen. The average lag-time* was 120 hours. The duration of the response ranged from 24 to 180 hours, with an average of 99 hours. The degree of estrogenic activity attained was one plus in 3, two plus in 4, three plus in 2, and four plus in 2 cases, respectively.

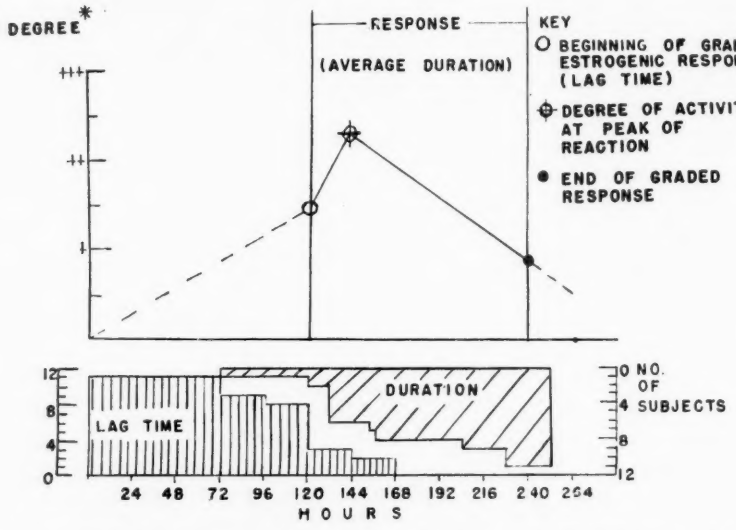

Fig. 1.—The averaged response of eleven subjects to a single injection of 2 mg. estrone.
*Degree + — 10 to 25% cornification of epithelial cells.
++ — 25 to 50% cornification of epithelial cells.
+++ — 50 to 75% cornification of epithelial cells.

TABLE I. DATA ON INDIVIDUAL CASES

CASE NO.	AGE	STATUS*	CASE NO.	AGE	STATUS
1a	54	M	13a	48	M
2a	41	SC	14a	52	M
3a	46	Me	15a	28	SC
4a	61	PM	16a	33	SC
5a	24	SC	17a	26	SC
6a	46	M	18a	37	SO
7a	22	RC	19a	27	SC
8a	41	SC	20a	53	SC
9a	45	SC	21a	41	SC
10a	42	SC	22a	46	SC
11a	52	M	23a	50	SC
12a	52	M			

*Status: M-Menopausal; PM-Postmenopausal; SC-Surgical Castrate; RC-Roentgen-ray Castrate; SO-Unilateral oophorectomy; Me-Menses persisting.

*"Lag-time" is defined as the time elapsing between the injection of the hormone and clear-cut evidence of estrogenic response in the vaginal secretion.

TABLE II. THE AVERAGE LAG-TIME AND DURATION OF THE ESTROGENIC RESPONSE

THERAPY	SUBJECTS: TOTAL TREATED	+	−	?	RESPONSE: LAG-TIME (HOURS) RANGE	LAG-TIME (HOURS) AVERAGE	DURATION (HOURS) RANGE	DURATION (HOURS) AVERAGE
Estrone 2 mg.	20	11	7	2	72-168	120	24-180	120
Estrone 4 mg.	21	10	7	4	48-168	101	72-192	110
Estradiol 0.5 mg.	21	11	7	3	24-168	99	24-192	110
Estradiol 1 mg.	18	10	3	5	48-144	91	48-168	104

2. *Subjective* (Table IV): Two of the seven women whose objective response was negative reported no improvement in subjective symptoms following administration of 2 mg. estrone; three were in doubt as to any relief and two experienced slight alleviation of their complaints. Eleven patients whose vaginal smears indicated varying degrees of estrogenic activity reported slight to complete symptomatic improvement over a three- to seven-day period. Of the two cases whose objective response could not be properly evaluated, one reported slight and the other no amelioration of climacteric disturbances.

TABLE III. THE ORDER OF EMPLOYMENT OF ESTROGENIC PREPARATIONS IN ALL CASES

PERPARATION	FIRST	SECOND	THIRD	FOURTH
Estrone 2 mg.	16	2	1	1
Estrone 4 mg.	1	15	3	2
Estradiol 0.5 mg.	6	3	12	0
Estradiol 1 mg.	0	3	2	13

TABLE IV. SUBJECTIVE IMPROVEMENT COMPARED WITH OBJECTIVE RESPONSE

SUBJECTIVE RESPONSE	PREPARATIONS: ESTRONE 2 MG. NO. CASES	OBJECTIVE RESPONSE +	−	?	ESTRONE 4 MG. NO. CASES	OBJECTIVE RESPONSE +	−	?	ESTRADIOL 0.5 MG. NO. CASES	OBJECTIVE RESPONSE +	−	?	ESTRADIOL 1 MG. NO. CASES	OBJECTIVE RESPONSE +	−	?	TOTAL: SUBJECTIVE RESPONSE	OBJECTIVE RESPONSE +	−	?
Complete relief	1	1			1	1			1	1			1		1		4	3	1	
Marked relief					1			1	6	2	3	1	9	7		2	16	9	3	4
Moderate relief	2	2			3	1	2		3	1	1	1	2	1		1	10	5	3	2
Slight relief	4	2	1	1	7	2	4	1	4	3	1		3	1	1	1	18	8	7	3
Questionable relief	9	5	4		5	5			3	3			2	1	1		19	14	5	
No relief	4	1	2	1	4	1	1	2	4	1	2	1	1			1	13	3	5	5
Total	20	11	7	2	21	10	7	5	21	11	7	3	18	10	3	5	80	42	24	14

B. *Following Injection of 4 Mg. of Estrone.*—

1. *Objective* (Tables I and II, Fig. 2): Twenty-one tests were made with 4 mg. estrone on 20 patients. In ten instances the vaginal smears showed a positive estrogenic response; in four the findings were questionable, and in seven, unaltered. The range of lag-time was from 48 to 168 hours; the average period elapsing between injection and a graded stimulation of the vaginal

mucosa was 101 hours. The duration of follicular response ranged from 72 to 192 hours, with an average of 110 hours. The degree of activity exhibited by these patients varied from one to three plus.

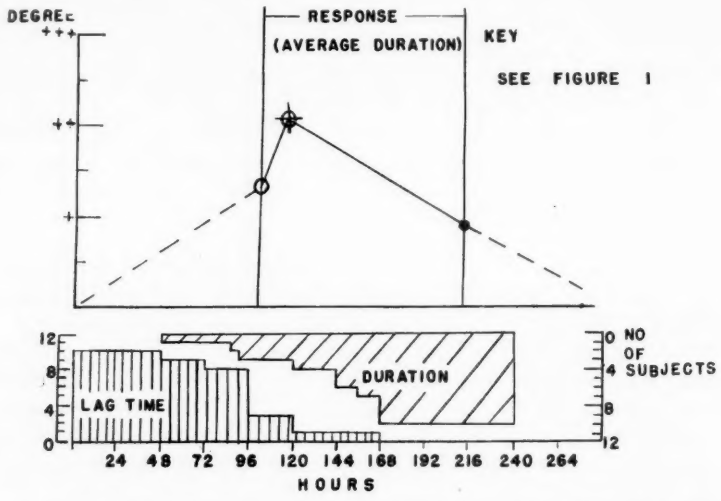

Fig. 2.—The averaged response of ten subjects to a single injection of 4 mg. estrone.

2. *Subjective* (Table IV): Complete relief of climacteric symptoms for a period of one week was noted by one woman whose vaginal smears indicated a high degree of cornification; marked relief for the same number of days was reported by a second subject (18a). Moderate improvement lasting from four to six days was experienced by three women, two of whom showed no alteration in the vaginal smear. Seven patients noted slight relief for approximately four days following the injection, although four of them gave no evidence, objectively, of hormonal stimulation. Four women whose smears showed definite follicular responses reported "questionable" improvement. Four subjects were not benefited at all: the vaginal smears of two in this group indicated an estrogenic response.

C. *Following Injection of 0.5 Mg. Estradiol.*—

1. *Objective* (Tables I and II, Fig. 3): Twenty-one women treated with injections of 0.5 mg. estradiol, responded positively, seven, not at all, and in three cases the results could not be evaluated. The number of hours between injection and the observation of a graded response in the vaginal mucosa of the eleven "positive" cases ranged from 24 to 168, with an average of 99 hours. The duration of estrogenic activity, measured by our standards, ranged from 24 to 192 hours, with an average of 110 hours. The degree of activity manifested varied from one to four plus.

2. *Subjective* (Table IV): Fifteen of the twenty-one women who received treatment with 0.5 mg. estradiol reported degrees of symptomatic relief varying from slight to marked; objectively, changes were observed in ten of this group. The vaginal smears of two patients who thought they might have been relieved showed follicular stimulation of the vaginal epithelium. In four cases there was no subjective response: the vaginal smears of only one of these four indicated some degree of hormonal activity (Table IV). The average duration of symptomatic improvement was five days.

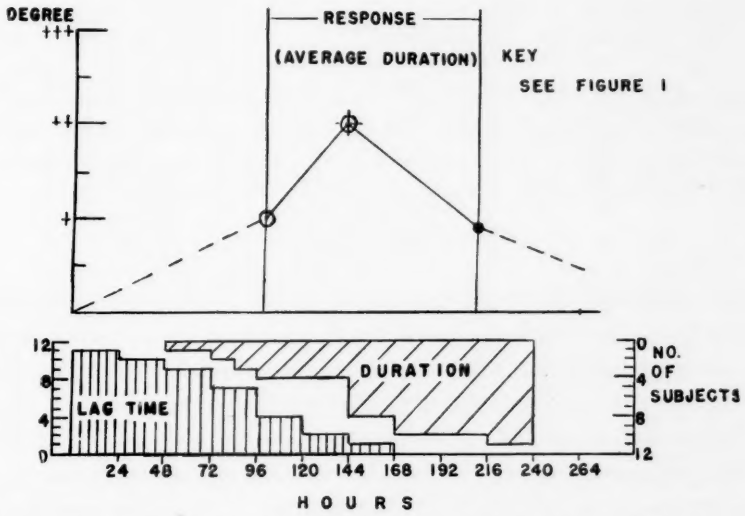

Fig. 3.—The averaged response of eleven subjects to a single injection of 0.5 mg. estradiol.

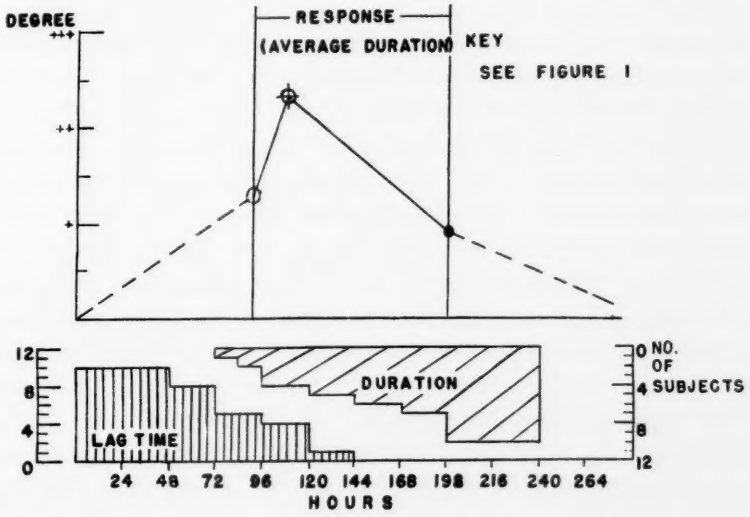

Fig. 4.—The averaged response of ten subjects to a single injection of 1 mg. estradiol.

D. *Following Injection of 1 Mg. of Estradiol.—*

1. *Objective* (Tables I and II, Fig. 4): In 18 tests on 17 subjects, the administration of 1 mg. estradiol evoked an estrogenic vaginal response in ten instances, a doubtful one in five, and had no effect in three. The range of lag-time was from 48 to 144 hours, with an average of 91. The duration of the response varied from 48 to 168 hours and averaged 104. It reached a maximum degree of four plus in one, three plus in two, two plus in four, and one plus in three patients.

2. *Subjective* (Tables I and IV): Of the 17 women treated, one reported complete relief of all symptoms. Improvement was marked in nine patients, moderate in two, slight in two, and doubtful in two. One woman derived no noticeable benefit. Periods of relief varied from four to ten days.

Discussion

Following repeated frequent administration of estrogenic hormone, "withdrawal bleeding" in monkeys and human castrates is a common phenomenon, pointing to the cumulative effect of successive doses.[3] We agree with Phelps[2] that the nature of any alteration in function or morphology of the genital tract is dependent upon the interaction of several factors, chief among which are the exogenous hormonal stimulus and the physiologic status of the subject in relation to its application. For instance, following estrogenic therapy in the menopausal woman, who has not menstruated for a considerable period of time, bleeding may occur in association with all the phenomena usually attendant upon her previously "normal" cycles. Here the exogenous hormone may have acted upon a pituitary-ovarian mechanism that had not become completely quiescent. The bleeding which occurred in patients 1a, 6a, and 14a of the present series is believed to have been of this type. In evaluating our results, we have attempted to eliminate in so far as possible any effects which might have been due to prior conditioning or "priming" of the subject, either as a result of her own or exogenous hormonal activity. Although the amount of hormone injected was small in each of the patients under study, frequently the appearance of smears taken fifteen to twenty-one days later was different from that of those obtained prior to therapy. Changes noted included an increase in the number of superficial cells with an occasional cornified cell, and a relative decrease in the number of elements of the deeper epithelial layers. Insofar as possible, we have allowed our subjects to return to a pretreatment status before administering an addditional dose of estrogen, thus minimizing the possibility of a conditioning or "priming" reaction. From our observations, 4 mg. of estrone and 1 mg. of estradiol appeared to be equivalent in hormonal activity. Within the scope of the present procedures, the lag-time of estradiol was slightly less than that of estrone; however, no significant differences were noted in the duration and degree of follicular reaction. In another series of cases treated with a variety of estrogenic preparations over a wide range of dosage, we found that the duration and degree of the vaginal response were directly proportional to the amount of hormone administered. Furthermore, the lag-time was inversely proportional to the size of the dose.[1]

Why does a patient respond to one estrogenic preparation and not to another? Patients 6a and 21a reacted objectively at both dosage levels of estradiol and at neither of estrone. Patient 14a was vigorously influenced by both injections of estrone, but only slightly by the larger amount of estradiol and not at all by the lesser. In Cases 14a and 21a, vaginal changes, capable of gradation, occurred following the third and fourth injections of the series. Patients 2a and 23a exhibited estrogenic alterations of the vaginal smear only following treatment with 1 mg. of estradiol, which, in both instances, was the final injection of their series of four each. The possibility of "priming" of the mucosa by previous therapy, although not always evident on control smears, cannot be overlooked. However, this explanation does not hold for Subject 6a, who received alternate injections of estrone and estradiol and responded only to the latter preparation. In view of the fact that a postmenopausal sexual rhythm has been demonstrated,[4] one may postulate that, depending upon hormonal status of patient at the time, the injection of estrogen could result in either augmentation or inhibition of endogenous endocrine activity.

In four instances, a second injection of any given preparation initiated a lesser degree of activity than the first. The presence of a relatively high percentage of cornified cells and superficial cells in the vaginal secretions of some untreated castrates and postmenopausal women indicates that other endocrine structures play a part, albeit a minor one, in the maintenance of the vaginal mucosa in the absence of the ovary.

The difficulties involved in interpreting the objective changes following test doses of estrogens are paralleled by those attendant upon symptomatic analysis. For instance, in the climacteric patient psychological factors may be and usually are important. Patient 19a was a highly irritable, neurotic surgical castrate, who entered the hospital demanding frequent injections of estrogen. For a period of three weeks prior to actual hormone therapy, she was given a series of injections of sterile water, one every third day, which she alleged markedly alleviated her symptoms, but only temporarily. It is equally important not to discount the symptomatic improvement in patients such as 15a. She was a 28-year-old castrate, who, when first observed, presented a long entangled list of complaints running the gamut of the menopausal syndrome. She was successively given injections of each of the four preparations at intervals of three weeks, with dramatic improvement in all her symptoms and in her "sense of well-being." Indeed, by the end of the period of four injections she had experienced a nearly complete change in personality. Smears were taken daily throughout this period and showed *no* indication of an estrogenic stimulation of the vaginal mucosa.

From Table IV, it is clear that approximately half the subjects who obtained some degree of symptomatic relief also showed recognizable alterations in the vaginal mucosa.

As a rule, when relief was complete, the vaginal reaction was positive.

In other words, the degree of improvement and the incidence of estrogenic effects upon the vaginal secretions varied directly. These observations are

of great importance to the practicing clinician, as he is continuously on the alert for an estrogen which will remove all symptoms of the climacterium without reactivating the uterine and vaginal mucosa. It would seem that neither estradiol nor estrone meets these requirements ideally, nor is one significantly better than the other. However, when properly administered, satisfactory relief of climacteric symptoms may be maintained by either one over long periods of time with a relatively low incidence of undesirable bleeding from the lining membrane of the uterus.

Conclusions

The vaginal mucosa of the majority of climacteric women reacts objectively to one or more injections of estrogen, not exceeding 1 mg. of estradiol or its equivalent of estrone (4 mg.) in any single dose.

The individual variations in lag-time, duration, and degree of estrogenic response are considerable, due to such factors as age, hormonal balance, and previous therapy. However, when data are averaged, it appears that the time elapsed between the injection of estradiol and a graded response was slightly shorter than the corresponding value for estrone. The duration and degree of activity are similar in all preparations tested.

Observations of daily vaginal smears lend support to the theory that repeated injections of estrogen condition or "prime" the vaginal epithelium to the further influence of the ovarian follicular hormone.

Varying degrees of symptomatic relief have been observed in a high percentage of climacteric women following one or more injections of an estrogen. The relief of subjective symptoms precedes appearance of alterations observed in the vaginal smear and can be directly correlated with them only in a very rough way.

Summary

1. Twenty-three women with climacteric symptoms have been treated successively with aqueous suspensions, containing respectively 2 mg. estrone, 4 mg. estrone, 0.5 mg. estradiol and 1 mg. estradiol. A minimum period of three weeks has been allowed to elapse between each two subcutaneous injections. A total of 80 tests has been made.

2. Control vaginal smears were taken daily for several days prior to therapy and daily thereafter for an average period of eleven days. Approximately 1,100 vaginal smears have been examined.

3. The injection of estrogen was followed by some degree of follicular stimulation of the vaginal epithelium in 69 per cent of the test subjects.

4. The average "lag-time" following the injection of (a) 2 mg. of estrone was 120 hours; (b) 4 mg. of estrone, 101 hours; (c) 0.5 mg. of estradiol, 99 hours; and (d) 1 mg. of estradiol, 91 hours.

5. Estrogenic effects on the vaginal mucosa due to the injection of (a) 2 mg. of estrone lasted 120 hours; (b) 4 mg. of estrone, 110 hours; (c) 0.5 mg. of estradiol, 110 hours; and (d) 1 mg. of estradiol, 104 hours.

6. The height of the estrogenic response in the vaginal mucous membrane varied widely and could not be correlated with the amount of hormone administered.

7. Certain factors involved in producing alterations in the objective response have been discussed.

8. Symptomatic relief was experienced by twenty-one of twenty-three women following injection of one or more estrogenic preparations. A cumulative action could be demonstrated as a result of repeated injections.

9. Complete or partial amelioration of climacteric symptoms cannot be directly correlated with the objective response.

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VAGINAL REMOVAL OF THE UTERUS BY MORCELLATION*

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STATISTICALLY, vaginal hysterectomy is a safer procedure than abdominal hysterectomy.[1, 2, 3, 6] In addition, according to the testimony of the patient who has had a previous laparotomy, it is definitely a less painful experience. Simple vaginal hysterectomy can be done more quickly than abdominal removal but, technically, the vaginal approach is a bit more exacting for the surgeon. These demands on the technical skill, time, and strength of the surgeon are increased in proportion to the extent and location of the pathology to be removed. These increased demands, however, should not deter him from his efforts to acquire and constantly improve or extend these techniques in the interest of safety and comfort of his patient. Many vaginal hysterectomies are denied patients because of the increased size or fixation of the uterus. These contraindications are only relative and should be determined by the surgical skill, stamina, and judgment of the operator.

Delivery of an infant through the vagina has been proved to be a safer method of birth than any abdominal procedure. Even traumatic vaginal deliveries are attended with less shock and possibilities of peritoneal infection than are those by the abdominal route. The high resistance of the pelvic peritoneum and the lack of exposure and trauma of the other important abdominal viscera are undoubtedly essential features in this difference. We are able, in delivery of a child, to introduce the hand or instruments into the vaginal canal or uterus and deliver intact a nine- or ten-pound mass of tissue. The following morning the patient usually feels well enough to ask to sit up, or, in these days of early ambulation, even to go home. The normal vaginal tract of a woman who is not pregnant is also large and dilatable enough to allow us room for adequate exposure and removal, by morcellation, of similar masses of pathologic tissue from the pelvis.[6, 7] The anatomy of the vagina, with its elastic walls and possibilities for incisional enlargement, make it one of the most ideal passages in the human body as an approach for removal of diseased tissue from the lower abdomen. The enlargement of the vaginal canal by birth, which eventuates in the prolapse of the uterus, bladder, and bowel, not only points the way to vaginal removal but frequently demands coincidental reconstructive repair as an important last stage in our operative procedure. Certainly, the available space, even in the virginal vagina, is many times greater than that of the nasal, aural, bronchial or urethral canals through which major surgical procedures are regularly performed. The increased safety and comfort to the patient by the morcellation

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of the enlarged prostate with the resectoscope, as compared with the older suprapubic method, thus minimizing soiling and trauma of the peritoneal cavity, is a striking example of improvement in results by an approach to the pathology through a natural passage.

Most reports dealing with vaginal hysterectomy have dealt only with overall mortalities and morbidities. Few critical attempts have been made to evaluate the relative importance of the various procedures such as morcellation of an enlarged uterus, removal of the adnexa, or vaginal repair, when they have been added to the procedure of vaginal extirpation of the uterus. Much of the discussion of these reports has been concerned with size and position of the uterus which can be safely removed through the vaginal canal. The extensive changes in anatomic relationships and wide dissections necessary for the repair of uterine and pelvic floor prolapse, which is the usual indication for vaginal hysterectomy in many clinics, have never been properly evaluated as factors causing increased morbidity or mortality. We believe that repair of prolapses is, as a group, the most difficult and dangerous of any of the vaginal procedures. In such cases, injuries to the displaced bladder, ureters, and rectum are more apt to happen than when the organs are in their normal position. Bleeding is more pronounced from the dilated vessels and accurate hemostasis is more difficult. The simplest and safest hysterectomies are those performed on nulliparas.

This study of 640 patients who have been subjected to vaginal removal of the uterus and its associated procedures is an attempt to clarify some of these questions. Admittedly the group is small for statistical comparison. Furthermore, when this number is reduced by division into subgroups, the chance for error becomes even greater. We have felt that the uniformity in care might offset these errors somewhat, and that certain suggestive conclusions could be safely drawn.

These patients were all operated upon during the years from 1931 to 1947 (August) by one operator in the same hospital with only slight variations in technique. Most of them form a part of the larger group which has been recently reported from our clinic by Dr. Zeph B. Campbell.[3] They represent results obtained during the period as a novitiate as well as during the more mature phase of operative experience. The most important variables which have occurred in this series have been a gradual improvement in the preoperative preparation of the patient and perfection of operative technique, more frequent employment of blood or plasma, and the addition of the antibiotics. Sodium Pentothal as a means of induction has been the only important change in anesthesia.

For comparison, this series of patients has been divided into six groups:

1. Simple vaginal hysterectomy	129
2. Vaginal hysterectomy with repair	249
3. Vaginal hysterectomy by morcellation	125
4. Vaginal hysterectomy by morcellation with repair	78
5. Vaginal hysterectomy with removal of one or both adnexa	43
6. Vaginal hysterectomy by morcellation and removal of one or both adnexa	16
Total	640

The various groups can be regrouped conveniently into two main divisions of about equal numbers, 313 patients in whom no vaginal repair was done and

327 who required reconstructive surgery. Still further comparisons can be made by another regrouping into 219 in whom morcellation of the uterus was necessary and 421 where the corpus was removed intact.

Vaginal hysterectomy without vaginal repair		313
Vaginal hysterectomy with repair		327
	Total	640
Vaginal hysterectomy requiring morcellation		219
Vaginal hysterectomy without morcellation		421
	Total	640

The complications arising during operation in the entire group were few. In one patient, rather severe evidence of shock appeared during the later stages of an extensive anterior and posterior repair following the vaginal removal of the uterus. Cessation of anesthesia, starting blood transfusion and intravenous glucose solution promptly improved the condition of the patient so that the operation could be safely completed. Subsequent blood transfusions were given. The convalescence was uneventful and the patient was discharged from the hospital on the twelfth postoperative day.

A small opening was made into the urinary bladder as it was being separated from the anterior wall of a uterus which required morcellation for removal. This lesion healed by primary intention following immediate closure and drainage for eight days with an indwelling catheter. This is the only known important injury to the urinary tract in this group of 640 patients.

Carcinoma of the uterine body was encountered five times. We believe this finding should indicate routine preliminary dilatation of the cervix and curettage before vaginal hysterectomy is undertaken. This should be especially true if morcellation or opening of the uterine cavity becomes necessary during the course of the operation. Three of these carcinomas were early and the gross or preliminary examination of the uterine scrapings were thought to be benign findings. In another, cancer was suspected, due to the type and quantity of the tissue obtained by curettage. Benign hyperplasia was the diagnosis made in the laboratory from frozen section. Celloidin sections revealed definite adenocarcinoma of the endometrium. X-ray treatment followed this diagnosis. In the fifth patient, the diagnosis of carcinoma was made grossly. Three thousand mg. hours of radium were immediately given and the usual course of x-ray begun one week later. At the end of five weeks, a complete vaginal hysterectomy and salpingo-oophorectomy were done. The three early cases were done on April 12, 1939, March 26, 1944, and Oct. 4, 1946. Two of them are alive and apparently well. One of them, operated upon on March 26, 1944, re-entered the hospital and was operated upon by the general surgical service on Feb. 15, 1948, for partial bowel obstruction due to a mass of grossly malignant tissue in the pelvis. A colostomy was done but no sections were removed for confirmatory evidence. The patient in whose case the frozen section was in error was operated upon July 29, 1936. She was 63 years of age, weighed 200 pounds, and her blood pressure was systolic 200, diastolic 120. The electrocardiogram indicated an arteriosclerosis involving the coronary artery. Our recent efforts to trace her have been ineffective and we presume that she is dead. The fifth patient was operated upon April 15, 1939. She was given further x-ray in 1941 for a probable recurrence, and since that time we have been unable to trace her.

The commonest postoperative complications occurring in all groups were cystitis, delayed postoperative hemorrhage, and pelvic abscess. The complications were quite evenly divided among the various groups.

Cystitis occurred almost twice as frequently, however, in those patients subjected to morcellation of the uterus as in those in whom simple vaginal hysterectomy was performed. This fact, coupled with the increased frequency of cystitis in vaginal hysterectomy without incision of the vaginal walls, suggests that it may be due to the mechanical manipulation of the tissue in the confined space of the vagina. We have limited the diagnosis of cystitis to those patients in whom elevated temperature or urinary findings delayed the patients' normal recovery, or persisted until the postoperative office visit. Transient temperature elevations, urinary dysfunctions, and cellular reactions in the urine, we believe, are as much a normal reaction to the necessary operative trauma in vaginal surgery as is the postoperative leucocyte-laden serous vaginal discharge that occurs in almost every patient. We do not believe that they should be used as an argument against vaginal hysterectomy any longer. Several of the persistent cases of cystitis were found to have bladder polyps, diverticula, or a coincidental urethritis and vaginitis. Subsequent treatment of these conditions improved or cured the urinary symptoms.

Delayed postoperative hemorrhage occurred more than twice as frequently in those patients requiring vaginal plastics. In four of the total of ten patients, the bleeding arose in the anterior or posterior vaginal incision, while, in the remainder. a small vessel in the corner of the vaginal cuff seemed to be the origin of the bleeding. In most instances, the edges of the incision were widely separated, suggesting pressure from a previous hematoma or infection. Infection seems to be the more probable since pelvic abscess occurred four times as often following repair as in those patients who were subjected to vaginal hysterectomy alone. In previous years, attempts were made to control postoperative hemorrhage by packing the vagina tightly with cotton tampons. However, this occasionally placed undue tension on the vaginal incisions with partial separation of the repair. More accurate hemostasis is now obtained by prompt resuture with a minimum of trauma to the previously repaired surrounding structures. In one instance, however, during resuture for bleeding which had occurred for the second time in the same patient, a rectovaginal fistula was produced. This fistula closed after fulguration of the fistulous tract and the patient has had no further difficulty. Accurate hemostasis following morcellation of the uterus is possible because postoperative bleeding occurred in only two patients on whom this procedure was carried out. In two instances, the postoperative bleeding occurred within twelve hours following operation, indicating that primary suture was inadequate. The remainder occurred from five to twenty-one days postoperatively. The loss of blood was severe enough in three patients to require blood transfusion, although blood was given to several others as a prophylactic measure.

Postoperative respiratory difficulties were about equally divided among the various groups. They have been less frequent than in a comparable group of laparotomies. This might be expected on account of freer ambulation and decrease in splinting of the abdominal muscles by pain or abdominal supports following laparotomy. This fact may also help to explain the low incidence of thrombophlebitis. One such instance occurred following vaginal hysterectomy with repair, and the other followed morcellation of the uterus. As has been mentioned, we believe that preoperative eradication of foci of infection and blood transfusion are the more important factors in preventing this serious complication.

A total of one hundred fifty transfusions were given, 94 before operation and 56 following operation. One patient entered the hospital for vaginal bleeding with a hemoglobin reading of 6.5 Gm. She received five preoperative 500-c.c. blood transfusions, and two after operation. Twenty-five per cent of the entire group of patients entered the hospital with their hemoglobin below 70 per

cent. Since prolonged bleeding with its consequent anemia has been described as an important factor in thrombophlebitis and pulmonary embolism, it is noteworthy that no patient died as a result of embolism, although, in two patients, x-ray evidence indicated that small pulmonary embolic infarctions had occurred. Pulmonary embolism stands high among the causes of death in the reported cases following abdominal hysterectomy.

Tabulated according to the usual morbidity standards with which we do not agree,[3] one hundred sixty-nine patients, or 26.4 per cent, were morbid. We agree with Jones and his co-workers[8] that morbidity figures would mean much more if they included only those conditions which complicate or delay the normal course of convalescence or are followed by symptom-producing sequelae. There were 610 days of morbidity in these 169 patients. The average morbid days were greater in those patients in whom vaginal repair was added to straight vaginal hysterectomy. This fact may be accounted for partially by the greater number of extensive prolapse cases that are included in this group. Morbidity was less in those patients subjected to vaginal morcellation of the uterus but proportionately more than in the remaining operative procedures. These figures for morbidity are reflected in the average days of hospital stay. However, a review of those patients operated upon since the advent of early ambulation indicate that these proportions may be changed in future studies. It is quite certain that the average hospital stay of 12.9 days will be appreciably and safely decreased.

The only death that occurred in this series followed vaginal hysterectomy and repair in a multipara with rheumatic heart disease. Death resulted from an unrecognized small bowel obstruction caused by an adherent loop of ileum to the vault of the vagina. The clinical course was confused by the coincident cardiac symptoms. However, in retrospect, a review of this patient's clinical course leaves little or no excuse for failure in diagnosis of the obstruction and it should have been an easily prevented death. The mortality rate for this series of 640 cases then was 0.16 per cent, which is lower than the 0.32 per cent previously reported[3] for the larger group of which these patients are a part. Since the pathology in about one-third of these patients was as extensive as that used for the usual indications for abdominal removal, it would seem that a comparison of mortality rates with a like number of abdominal hysterectomies would be fair and suggestive. Compared with the rates reported from representative large clinics I think the answer is obvious; 2.4 per cent against 0.32 per cent to 0.16 per cent.

As one would expect, the greatest number (452), or 70 per cent of these uteri were removed from patients 40 years old or older. Many of those younger than 40 years, were operated upon for conditions other than vaginal hemorrhage such as painful adenomyomas, intrauterine fibroids, cervical strictures, recurrent polyps, or as a method of sterilization and an integral part of pelvic floor repair. Three of them were operated upon for prolonged intractable bloody discharge following previous intrauterine radium which had been given elsewhere for uterine bleeding. We believe that this entire group of women was treated more conservatively and probably as safely, by vaginal hysterectomy than they would have been by the widespread killing action of irradiation.

In our opinion, castration irradiation for benign disease is one of the most destructive of gynecologic operations. All function is destroyed, leaving useless organs in which distressing sequelae or cancer may later develop.

In summarizing the experience gained in operating upon the 640 patients reported above, we believe that vaginal removal of the uterus by morcellation is as safe as, and certainly more comfortable for the patient than, other forms of hysterectomy. Judgment gained by experience in evaluating the accessibility of the important blood vessels, anterior and posterior cul-de-sacs, and the com-

ponent parts of the uterine tumor is more important than size alone. The postoperative morbidity, mortality, and complications, with the exception of cystitis, were less frequent in this group of patients than in those who required coincidental vaginal repair.

Discussion

DR. EUGENE A. EDWARDS.—Certainly no gynecologic staff is more qualified to report their experience with vaginal hysterectomy than is the group from Presbyterian Hospital.

I believe Dr. Allen's conclusion that vaginal hysterectomy with morcellation is a safe operative procedure is justified, as is evidenced by the good results he presents. However, we must remember that the operator of these cases is thoroughly trained in vaginal surgery, and years of continuous doing has greatly added to his experience. I believe that vaginal hysterectomy with morcellation is a safe procedure when performed by one who has had such training.

Our experience is not as extensive as is reported in this series. We have performed 42 morcellation operations in 570 operations, with complete success in all of them.

I believe the simplest vaginal operation is the removal of a bleeding uterus from a nullipara. The next easiest vaginal hysterectomy is the removal of the fibroid, freely movable uterus approximately the size of a 3 or 3½ months' pregnancy by morcellation. The repair of the anterior and posterior vaginal walls in association with vaginal hysterectomy complicates the operation because of the much more extensive bleeding. Previous vaginal surgery, where a repair has been performed or where radium has been used, also greatly complicates the vaginal removal of the uterus.

The removal of the fibroid uterus that extends to the umbilicus or above is probably best accomplished through an abdominal incision. However, an attempt should be made to remove this large a tumor by vagina, when associated with cystocele. I know of no way to cure a cystocele unless it is repaired vaginally. The removal of such a tumor may not seem possible; however, if an attempt is made, it is surprising how many times its removal is accomplished. If, on the contrary, it is impossible to remove the tumor, the uterine arteries are tied off, the cystocele is dissected out and the hernia is repaired by suture to the uterosacral ligaments. Then the abdomen is opened and very easily the ovarian arteries are ligated and the uterus removed.

There are certain indications and contraindications to vaginal removal of the uterus:

1. The operator must be experienced in vaginal surgery.
2. A correct diagnosis is most important.
3. Intraligamentous fibroids and fibroids under the urinary bladder are best removed abdominally.
4. Abdominal pain usually contraindicates vaginal hysterectomy.
5. Intramenstrual bleeding usually complicates vaginal surgery.
6. Endometriosis may or may not complicate vaginal hysterectomy.
7. Ovarian tumors and carcinoma of the endometrium, except in the rare cases, contraindicate vaginal surgery.

Cystitis is also the most frequent complication in our series. However, in our experience, the repair of cystocele is the main factor in its etiology. In the 49 cases of cystitis, 41 had cystocele repair. We opened the urinary bladder five times, but each time it was detected, sutured primarily, and on no occasion did it influence the postoperative clinical course. We injured the ureter in two cases.

Postoperative bleeding has occurred in our series nine times, once on the sixth postoperative day, the others from the ninth to the eighteenth postoperative days. Resuture was necessary five times. Phlebitis occurred only once in our series. This was localized to a superficial vein and was of no serious consequence. There were no emboli in our series.

Three times carcinoma of the endometrium was encountered. We now try to prevent this serious problem by curetting all cases. Sarcomatous degeneration was encountered in two

cases. This complication I know no way to prevent, unless intramenstrual bleeding may give us a possible clue. The average hospital stay in this series was fourteen days. During the last year, this has been reduced to twelve and one-half days. There was one death in our series. This patient died of cardiac decompensation.

DR. RALPH A. REIS.—We have heard the painstaking review of a series of cases with most excellent results. Once again I think we should be impressed with the value of vaginal hysterectomy. Vaginal hysterectomy is well established. It is nothing new. At Michael Reese Hospital, vaginal hysterectomy was done long before total abdominal hysterectomy was done, just as it was done elsewhere. At the present time at Michael Reese Hospital, our group is doing a little better than 60 per cent of all hysterectomies by the vaginal route and 40 per cent by the abdominal route. Likewise morcellation is nothing new. Pean employed morcellation in 1873. If you read Doyen, you will find that, in 1895, he described fourteen or fifteen methods of morcellation. I confess that we at Michael Reese Hospital have, on occasion, done morcellation as is done at St. Luke's Hospital and at Presbyterian. I wonder why the proponents of vaginal hysterectomy would need to defend the procedure. Nobody questions its value. No one should bring up the point which Dr. Edwards mentioned, that we must know how to do hysterectomy before we discuss it. I would prefer to go on the assumption that those of us here now are equally competent to do vaginal as well as abdominal hysterectomy. I think each method has its distinct and definite place. We believe that hysterectomy should be done by the vaginal route except when there is either definite malignancy or suspicion of it, when there has been previous pelvic surgery, when there is adnexal disease with fixation or fixation plus an adnexal mass that is large. It should be done vaginally except when tumors are intraligamentous or adherent. Finally, it should be done vaginally unless the uterine mass in toto is larger than that of a twelve to fourteen weeks' pregnancy.

I should like to request of Dr. Allen, as I have previously of Dr. Campbell, not to compare the present-day statistics and their excellent results in vaginal hysterectomy with the older statistics for abdominal hysterectomy. I question whether any major institution in this area shows a mortality rate of 2.4 per cent, i.e. one death for every forty abdominal hysterectomies.

Recent statistics only as far back as the beginning of 1946, disclose a first report of Tyrone from the Ochsner Clinic. He lost one patient in 507 by the abdominal route, 0.2 per cent.

The next report is Feeney of Dublin who lost one in 388, that is 0.25 per cent.

The next is Siddall from Harper Hospital in Detroit. He lost one in 150, that is 0.76 per cent.

Finally from this Society, Danforth, Sr., at Evanston Hospital lost one in 250 and two in 500 reported, which is 0.4 per cent.

Those figures are a long way from the 2.4 per cent we heard tonight that is being used in comparison with vaginal hysterectomy.

Now let us consider the recent statistics for the vaginal hysterectomies. Campbell who has a large series had one in 310, which was 0.32 per cent.

Falk, in New York, reported one in 500, 0.2 per cent.

Allen who reports the best results, has one in 640, which is 0.16 per cent.

I concede that there is a slight difference in the mortality between abdominal and vaginal hysterectomy. But there is not anything like the marked difference that the essayist would lead us to believe. Dr. Leventhal is analyzing comparable hysterectomies at Michael Reese Hospital at the present time. In several hundred hysterectomies performed vaginally and abdominally for the same type of pathology, there is no difference in morbidity and mortality. Actually, in the last several hundred, there has been no death in either series. I still maintain that hysterectomy by either route has relatively precise indications. Large fibroids should be removed by the abdominal route.

DR. A. F. LASH.—I heartily agree with Dr. Allen regarding vaginal hysterectomy. I should like to show you a safer method of doing morcellation without opening the uterine

cavity. Occasionally we find in older women a pyometra or carcinoma which had not been suspected. After the tying of the uterine arteries, the uterus is removed by shelling out the myometrium around the uterine cavity, followed by turning out the remaining myometrial shell and usual removal. In carcinoma, there is danger of spillage and that is one of the objections to morcellation. After the uterine cavity is removed, the uterus can be further reduced in size by bisection. Further, I believe that in all women past 45, when the uterus comes out, the tubes and ovaries should come out, too. We do it quickly and regularly when we do an abdominal hysterectomy and there is no reason why we should not do it vaginally.

The next observation made regarding vaginal hysterectomy is that there are fewer ovarian cysts following vaginal hysterectomy than following abdominal hysterectomy.

Regarding bladder disturbances, I think in many instances we have a paracystitis rather than a true cystitis.

In spite of the fact that we have broad indications for vaginal hysterectomy, I do not believe in surgical acrobatics. There are many instances in which a woman has bowel symptoms and the abdominal approach is necessary. Every once in a while, about once in two years, we meet a carcinoma of the rectosigmoid where neither the symptoms nor the clinical findings pointed to it. There have been instances where the x-ray did not demonstrate carcinoma and yet there was a carcinoma in the rectosigmoid on opening the abdomen. It is, therefore, evident that our enthusiasm must be tempered by good judgment.

DR. ALLEN (Closing).—I am glad Dr. Edwards agrees with the safety of morcellation because so many times, as I said in the opening of this paper and in the discussion at the clinical meeting, the younger men say it is a stunt. I do not believe it is a stunt. We are firmly convinced of its value. We are not the ones who are on the defensive. I do not think we have to be on the defensive in a discussion of vaginal hysterectomy, especially from the standpoint of rapidity, increased safety to the patient, and comfort to the patient if nothing else.

I quite agree with Dr. Edwards about the location of the tumor. Tumors that are under the bladder, even if small, or immediately over the area of important blood vessels as they come into the side wall of the uterus are a contraindication often to either vaginal removal or morcellation. If one cannot reach those vessels rather rapidly then we agree that the tumor should be removed abdominally.

As far as statistics go, I would like to repeat a few that were reported in Dr. Campbell's paper, in which we took figures from a comparable time not only in operative technique but the various adjuvants of safe surgery, blood plasma, antibiotics, and increased knowledge of surgical technique, and in which we derived a mortality rate of 2.5 per cent. These were taken from clinics here and other notable clinics. Smith reported 1,837 cases with six deaths; Miller, 629 cases with 12 deaths; King, 537 cases with 5 deaths; Williams, 1,870 cases with 52 deaths; Mengert collected 1,925 cases with 38 deaths; Bryan, 842 cases; McDonald, 2 cases; Masson at the Mayo Clinic, 2,184 cases with 21 deaths, Dannreuther, 425 cases with 9 deaths. We reported at that time a comparable series of 898 cases with 10 deaths. This report I made tonight goes back to when I began to operate. If I were to take off the earlier cases there would have been no mortality. I do not think it is a fair thing to compare this last year of anybody's series with a period of 16 years back. I think you have to take a long period of observations to make it fair. When you do that you will find that vaginal hysterectomy carries a lower mortality and certainly more comfort to the patient.

I am interested in Dr. Lash's description of morcellation, particularly in cases of carcinoma. I tried to bring out by reporting these five cases that we encountered the risk in morcellation with carcinoma. We have been lucky enough in having no sarcomas either in this group or the last one. One of these patients I did know had a carcinoma but I do not think vaginal hysterectomy or morcellation is the treatment for carcinoma. I tried to find out in how many cases we started to do vaginal hysterectomy not suspecting, or only slightly suspecting, that it was a carcinoma, then introducing radium, and later operating on the patient by the abdominal route. I would like to know how many cases are operated upon by abdominal hysterectomy without previous dilatation and curettage and carcinoma of the body of the uterus is not found until the pathologic sections come back from the laboratory. I believe there are a considerable number.

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55 E. WASHINGTON STREET.

THE RELATIONSHIP OF ADOLESCENT MENSTRUATION TO BODY TEMPERATURE AND STERILITY*

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THE relative infertility of women for a variable period of time after the onset of menstruation has been recorded in the literature for centuries. Most of the early reports were made by ethnologists rather than the medical profession, but the earliest recorded reference to this subject was made by the Hindu physician Susruta in 500 B.C. He stated, "If a man under 25 years deposit his germ in a woman younger than 16 years, it will most likely die in the womb . . . even if it is born alive it will die soon, or he will be weakly as long as he lives." In more recent times medical observers have noted that although sexual intercourse is promiscuous among the natives of South Australia, Melanesia, New Hebrides, the Luzon section of the Philippines, and parts of India, pregnancy as a rule does not occur until several years after the menarche. There is no known use of contraceptives in these particular groups and the "abortive herbs" which are used by some have been investigated and found to be totally ineffective. In many of these groups there is no understanding of the relationship of intercourse to conception. In recent years a great deal of experimentation has been carried out on animals to determine the nature of this sterile period. The association of nidation and the elaboration of progesterone has been demonstrated in lower animals. In monkeys the early periods were found to be extremely irregular, and thought to be anovulatory. Hartman feels that each month the ovary produces larger and larger follicles until such time as they no longer degenerate, but go on to ovulation. He also found a lack of luteinization during the early months of menstruation and when pregnancy did result there was a high incidence of abortions. In the chimpanzee the sterile period was found to be about one year after the menarche even in those females which were caged with a male before the onset of menstruation.

Procedure

The subjects used in the present study were the daughters of a university professor. Both girls were asked to take their temperatures before going to bed and again before getting out of bed in the morning (5 minute oral temperatures were used). Both subjects started recording their temperatures shortly after the menarche. In one (H. K.), it was started after her second menstrual period, at the age of 12 years 6 months, and has been continued to the present time—a period of 6 years. In the other (E. K.), the records were started after seven periods, at the age of 12 years 2 months, and are still being continued at the present time—a period of four years. The temperatures, as indicated above, have been taken twice daily during this entire period, except for brief intervals of illness. This is a study of the first three years of temperatures correlated with the menstrual flow.

*Presented at a meeting of the Chicago Gynecological Society, Dec. 19, 1947.

Results

In an analysis of this type, the following procedure was followed. The first day of menstruation was designated as day zero (0) and each day preceding the onset of menstruation as –1, –2, etc.; in that way, since the ovulation—menstruation interval is relatively constant, any deviation from this would be brought out.

Fig. 1.—Using the records of H. K. and E. K., the intermenstrual interval is shown. The consistency of the interval can be noted. During the first year, perhaps they are not quite as consistent as those during the second and third years, but the difference does not seem to be appreciable.

Fig. 2.—Using the records of H. K., a frequency distribution curve was made comparing waking and bedtime temperatures for a period of three years. It demonstrates the frequency with which temperatures of 97° F. to 98° F. and 98° F. to 99° F. occur. Although the waking temperatures are somewhat more consistent, both show the characteristic changes.

Fig. 3.—In each subject, the first three years after the menarche was divided into approximately yearly intervals. The waking temperatures reveal a pattern during the first year which is considerably different from the second and third years, the latter two showing a striking similarity to each other. This is true in both subjects. During the first year, there is no sharp break in the temperature curve at the approximate time of ovulation. In the second and third years, there is a sharp break in the temperature curve at the expected time of ovulation. The break in temperature is very consistent in each of the subjects. The pattern is established after 12 months in H. K. and 18 months in E. K. The break occurred in H. K. on day –15, while in E. K. on day –10. The first year's records in both subjects show a gradual rise beginning at the estimated time of ovulation, which eventually approaches the level of the second and third years, but instead of the majority of the rise taking place over a period of 48 hours, as is usual in the adult, it takes a period of seven to eight days. This is constant in both subjects studied and the records of the individual months bring this out even more clearly. The curve is not one of averaging the typical curve of ovulation with the classical anovulatory curve, but is typical in itself, namely, a gradual rise in temperature over a period of a week starting at the estimated time of ovulation.

Fig. 4.—To bring this out in graphic form, the following analysis was made. In H. K. the average temperature of days –21 to –14 was compared to days –14 to –7. This was done each month for a period of three years to demonstrate that during the first nine recorded periods the average temperature before and after the expected time of ovulation was approximately the same. The pattern changed abruptly about one year after the menarche. When days –21 to –14 were compared to days –7 to –1, the full nature of the curve is brought out, namely, the similarity of the pre-menstrual week in all three years. This type of analysis also brings out the occurrence of the classical anovulatory cycles. This is now being studied to try to determine a seasonal frequency, if any.

Fig. 5.—Another attempt at the graphic presentation of the genesis of the typical ovulation curve was tried but with only a moderate degree of success. Using the records of H. K., each four-month interval was treated as a unit, and the charts shown are the frequency, in percentage, with which temperatures of 97° F. to 98° F. (white) and 98° F. to 99° F. (black) occur and the day in the cycle that they appear. It is obvious from Fig. 3 that, in this subject, a progesterone effect is probably associated with a temperature over 98° F. It can be noted that during the first four recorded periods there is a scarcity of temperatures over 98° F., and when they do occur the majority are grouped during the eight days preceding the onset of menstruation. When the next four months are treated in the same way, we find a much higher percentage of temperatures over 98° F. and the majority occur during the ten days preceding menstruation. During the next four-month interval, the majority occur during the thirteen days preceding menstruation. By this time, the adult pattern is established and the following two years are remarkably similar.

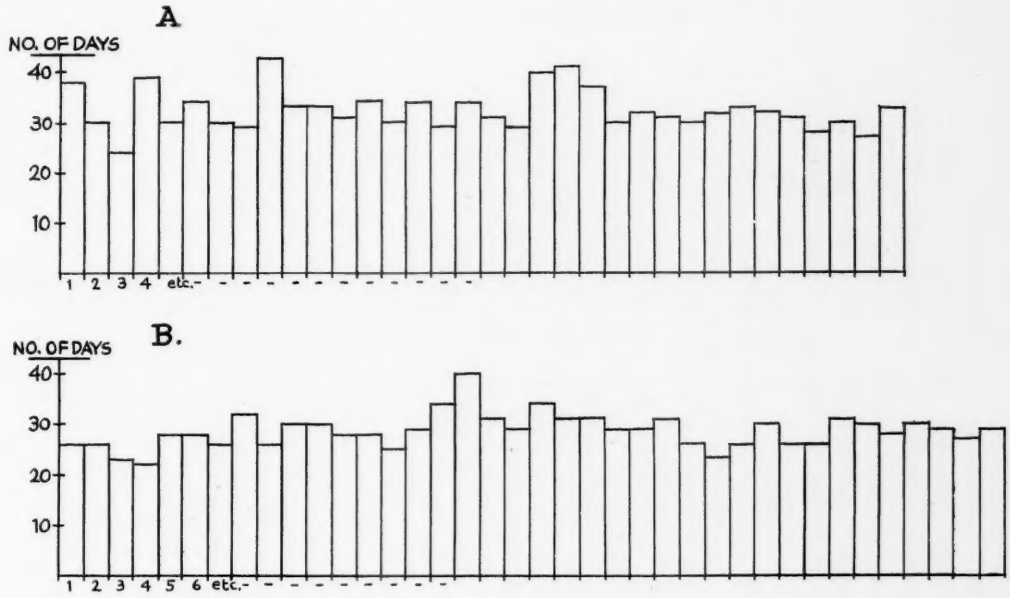

Fig. 1.—Intermenstrual interval. (A) Subject: H. K. (B) Subject: E. K.

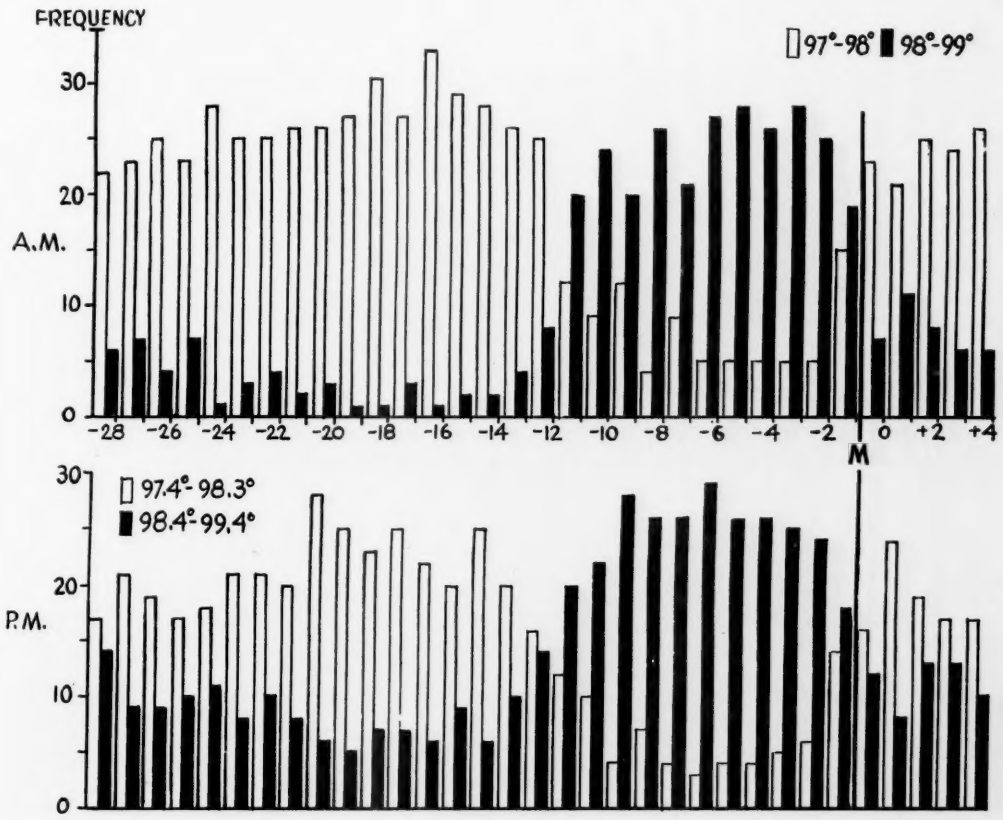

Fig. 2.—Days of the menstrual period. Subject: H. K. November, 1941, to November, 1944.

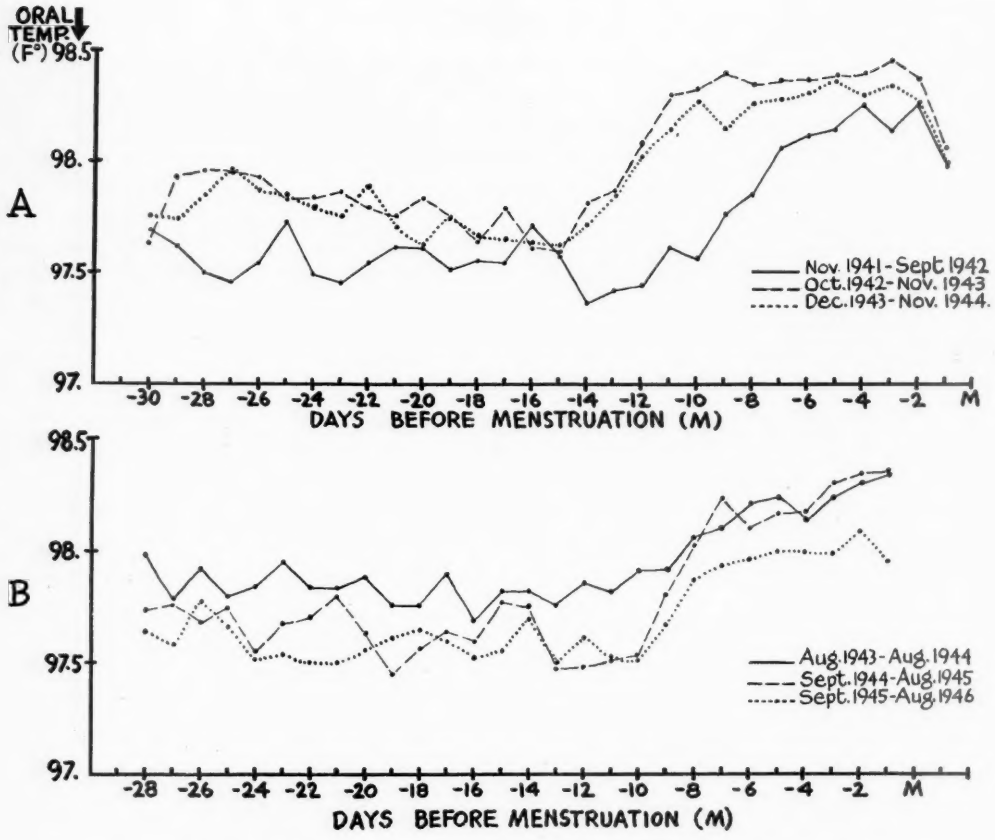

Fig. 3.—Mean A.M. temperature. (A) Subject: H. K. (B) Subject: E. K.

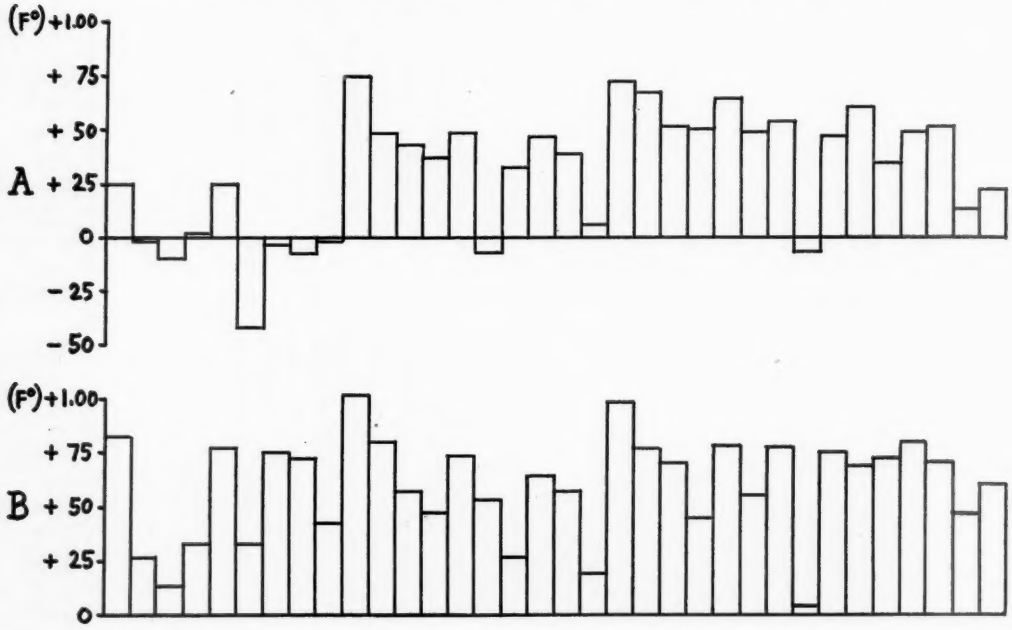

Fig. 4.—A. Average difference (F°) between days -21 to -14, and -14 to -7. B. Average difference (F°) between days -21 to -14, and -7 to -1. Subject: H. K.

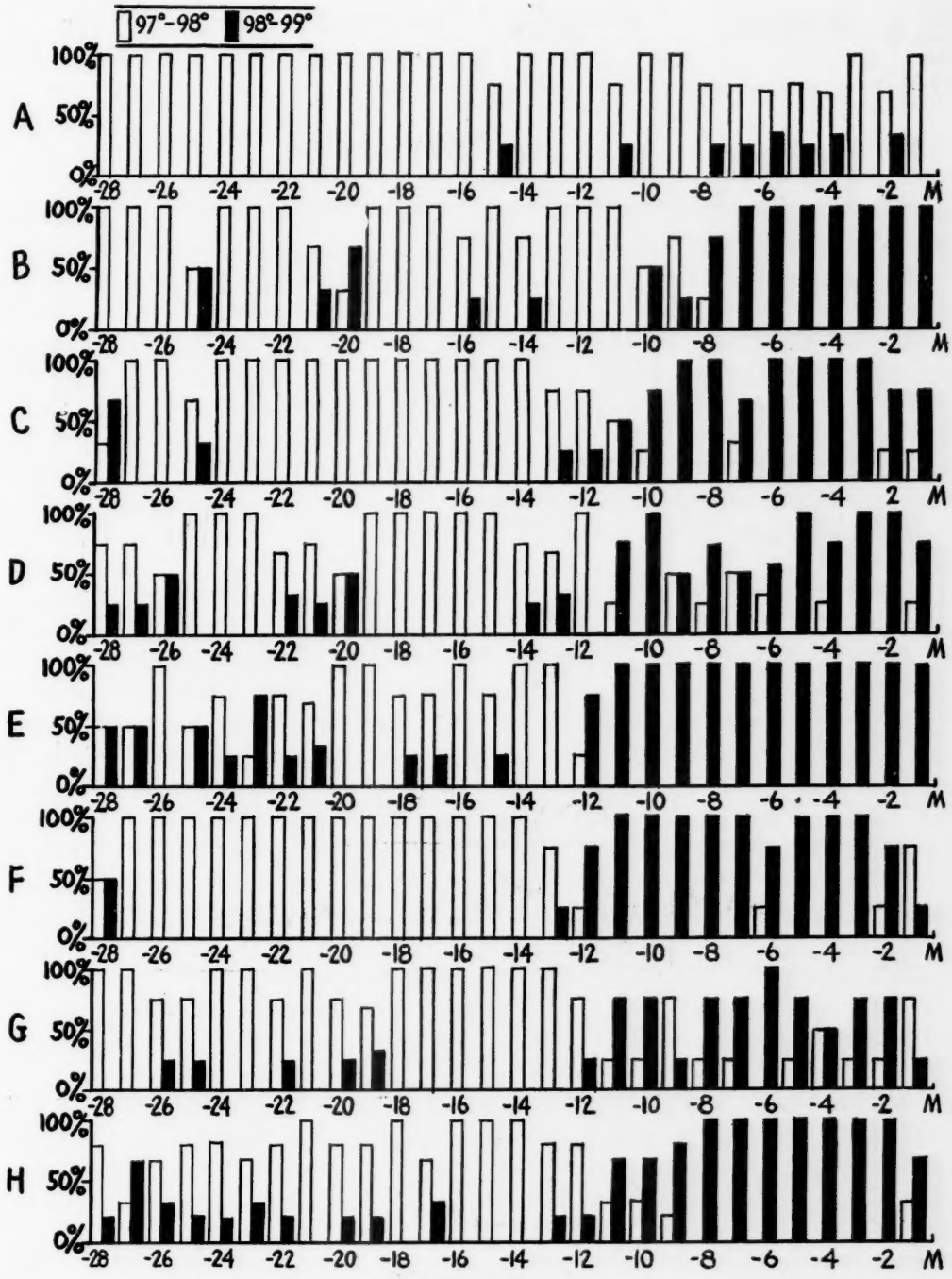

Fig. 5.—Frequency distribution. Subject H. K. November, 1941, to November, 1944.

A. First four periods
B. Second four periods
C. Third four periods
D. Fourth four periods
E. Fifth four periods
F. Sixth four periods
G. Seventh four periods
H. Last six periods.

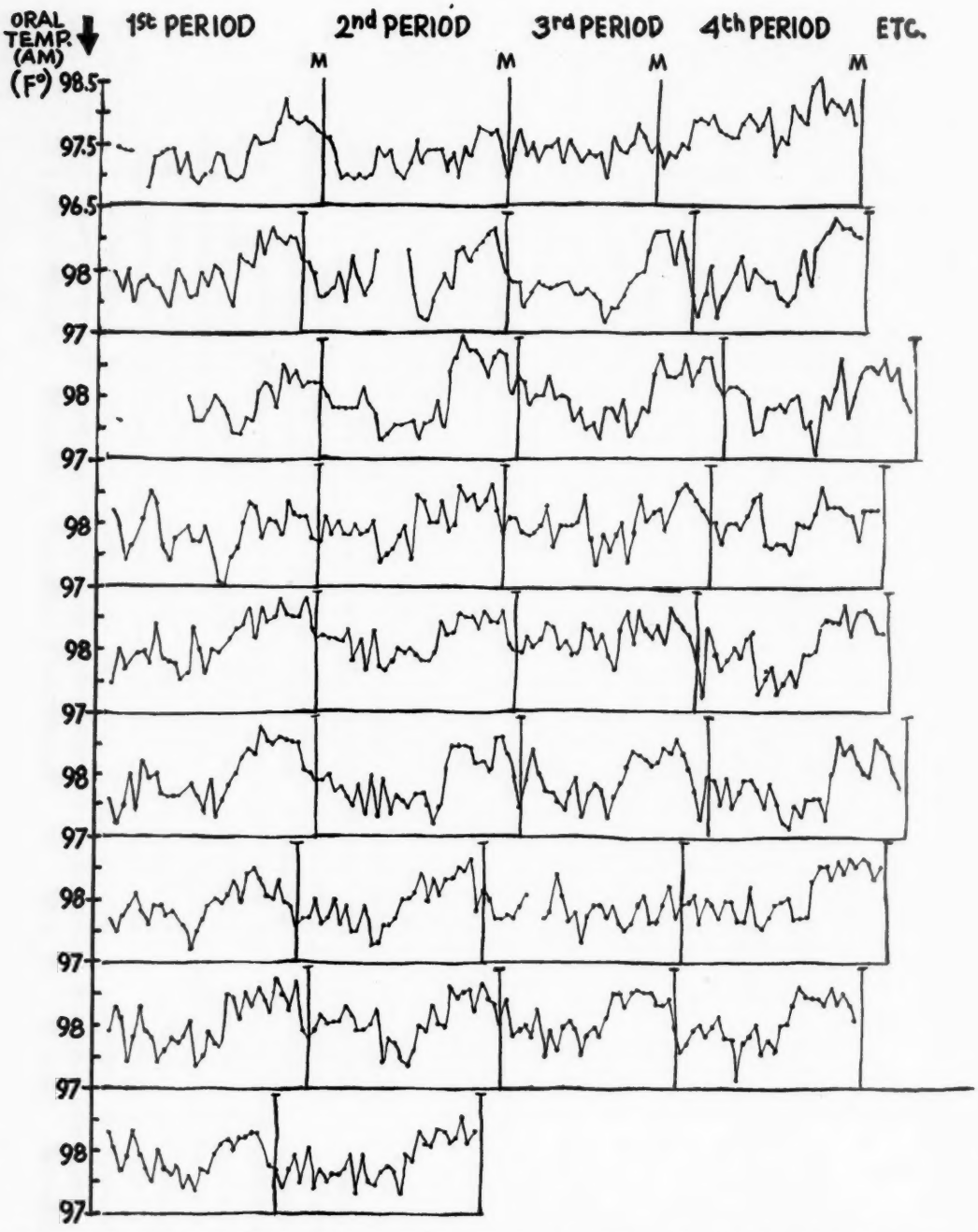

Fig. 6.—Subject: H. K. November, 1941, to November, 1944. Menstruation first day (M) 34 menstrual periods.

Fig. 6.—Using the records of H. K. and treating each menstrual period as a unit, a running chart for a period of three years is portrayed. This demonstrates graphically the change in the character of the temperature curve as one proceeds from the earliest menstrual periods to the more mature pattern. One can see that during the first nine months the temperature curve is not the typical ovulation curve. The second and third recorded periods are the classical anovulatory curves, but as one proceeds from here, they are of a

steplike nature. The periods of elevated temperatures increase and the break becomes sharper. This is brought out more clearly when one compares the early recorded temperatures to those taken during the second and third year. During the latter period, except for an occasional anovulatory curve, they are of the mature pattern.

Discussion

The postmenarchial stages in a woman's life may be divided into four periods. The period of puberty, the period of nubility, the period of maturity, and the period of senility. The period of nubility is that interval between puberty and maturity when the female is capable of procreation without appreciable danger to herself or her offspring. During this period, not only must ovulation be present, but the elaboration of progesterone must occur in sufficient amounts and early enough to insure nidation. The interval between puberty and nubility can be referred to as the adolescent sterility period.

As to the similarity of waking and bedtime temperatures, one may find it much more convenient for the patient to take the bedtime temperature. Although the bedtime temperature is not quite as consistent as the waking temperature, with proper understanding on the part of the patient it can be used effectively in the study of sterility. To avoid hot or cold drinks just before taking one's temperature is not a chore and if bedtime is variable the temperature could be taken at a definite hour each night. I feel that, in the study of sterility, during the week before the estimated time of ovulation, both waking and bedtime temperatures should be taken, for in that way an evening shift in temperature could be twelve hours closer to the time of ovulation.

Rectal, vaginal, and oral temperatures have been used in studies of this sort, and I believe it has been demonstrated conclusively that when two types were taken simultaneously in the same subject, the results were identical. Dr. Kleitman, a recognized authority on the role of body temperature in physiological processes, has advocated the use of oral temperatures in these studies for a long time. Nieburgs demonstrated the identical nature of oral and vaginal temperatures in a sterility study. He also showed that the use of estrogens during the first half of the cycle in girls who had irregular infrequent periods tended to bring about the characteristic diphasic temperature curve.

The intermenstrual interval shows a remarkable degree of consistency. The interval between the first and second period not shown on Fig. 1 being the exception, for in both subjects it was appreciably longer than any of the subsequent periods. The consistency is quite in contrast to the results obtained by Hartman using monkeys.

The thermogenic effect of progesterone has been adequately demonstrated by many investigators. Barton and Weisner used progesterone in oil (5 to 15 mg.) daily, which caused a slight but persistent rise in waking temperature. When progesterone crystals were used, 3.5 mg. per c.c. (2×10^5 crystals), the waking temperature was elevated within twenty-four hours and a distinct diphasic curve was obtained by three injections. This curve resembled the usual curve associated with ovulation.

This material demonstrates that the temperature curve for approximately 12 to 18 months after the menarche is different from that of the subsequent

years studied. If the accepted explanation is correct, namely, that the temperature rise is due to the action of progesterone, closely associated with ovulation, it follows that the prenubile woman either ovulates and forms a poorly functioning corpus luteum, or luteinization of the theca and granulosa cells follows the degeneration of the formed follicle. Regardless of which explanation is correct, the functional result is sterility.

Browne and Venning demonstrated in their studies on corpus luteum function that if chorionic gonadotropin is given in daily doses of 1,000 international units in the early part of the luteal phase, there is an increase in estrogenic excretion, the pregnandiol excretion is prolonged and the endometrial biopsies show histologic changes similar to early pregnancy.

Abarbanel, in correlating several hundred endometrial biopsies with basal body temperature curves, reveals that on the whole the classically defined diphasic basal body temperature is associated with ovulation as witnessed by conception and a fully developed secretory endometrium. On the other hand, a study of various aberrations revealed a secretory endometrium of the so-called mixed type or immature progestation phase (days 19 to 22 of a 28-day cycle) when taken on the first day of menses. In these instances, the basal body temperatures were either irregular or flat.

The temperature curve of the pubescent is rather characteristic and as consistent as the ovulatory or classical anovulatory curve. This type of curve is one frequently seen in the sterile adult. I should like to designate this as the intermediate temperature curve. The sterile adult with this type of curve may very well be one whose ovaries are still functioning in the adolescent manner. Much more work will have to be done to test the validity of the last remark. If the pubescent temperature curve observed in the adult indicates luteinization of the developed follicle without ovulation, then there appears to be no rational therapeutic approach as yet. However, if this curve represents ovulation with an associated defective corpus luteum function then therapy might be directed toward stimulation of corpus luteum function or the substitution of corpus luteum hormones.

Summary and Conclusion

The use of evening oral temperatures, if properly taken, can be used in the study of sterility. This, of course, could be combined with waking temperatures during the expected time of ovulation.

I believe the results of this study give a physiologic basis for the old observations of relative infertility in the female for a period of time after the onset of the menarche. As to whether body maturity also plays a role to extend this time interval is yet to be determined.

For a period of twelve to eighteen months after the menarche in the subjects studied, a characteristic temperature curve is evident. This is different from the mature type, as well as the classical anovulatory type. I should like to designate this steplike curve as the pubescent temperature curve. It has been suggested that when this type of curve is found in the sterile adult, corrective measures may be used, if the underlying cause is an immature attempt at corpus luteum function rather than lack of ovulation.

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Discussion

DR. JOHN W. HUFFMAN.—A woman's life is commonly divided into childhood, adolescence, maturity, postmaturity, and senility. Childhood and adolescence are stages in development. Adolescence is properly subdivided into two phases, the first, one of adolescent steriltiy during which menstruation without ovulation occurs, the second, one in which, although sexual growth is continuing, conception and reproduction are possible. It has been well demonstrated (Montagu's monograph, "Adolescent Sterility," brings together most of the source material) that in most mammals puberty and the power to procreate are not synchronous events but that puberty is separated from fecundity by a considerable interval of time during which the individual is functionally sterile.

Dr. Cooperman's observations are interesting additional evidence substantiating the presence of a period of adolescent sterility. He is to be congratulated on the cooperation of his young co-workers. It must have taken much effort to maintain the interest of these young persons in a scientific project over a period of six years; I sincerely envy their parents their control over their adolescent offspring. I wish that Dr. Cooperman had records of many more subjects for it is well known that all chronologically adolescent girls are not sterile. There are many authenticated case records of pregnancy occurring immediately after puberty, and sometimes in these individuals puberty has occurred at an extremely early age. There is no question but that most women are incapable of conception for some months after the onset of menstruation but the variability in human beings, due to the differences in developmental age, is so great that conclusions drawn from only two subjects cannot help being subject to question.

There is general acceptance of the belief that certain changes in a woman's basal temperature are indicative of ovulation. I have not been as fortunate in obtaining satisfactory results with basal temperature charts as have many of those reporting in the literature. It is exceptional for me to see a typical ovulatory or anovulatory curve. Most of the charts patients bring to me are either similar to the ones Dr. Cooperman has designated as adolescent curves or else are so irregular that, while a cyclic rise and fall in temperature can be made out, the fluctuations are not regular nor clean-cut enough to foretell the date of ovulation.

The temperature curves are valuable when they give concrete evidence of ovulation. I shall continue to use them because of the occasional one that is helpful.

DR. M. EDWARD DAVIS.—We have had considerable experience with the use of body basal temperature records in the endocrine and sterility clinic and have found it a very useful tool for the study of ovarian activity. In a recent study of over 500 temperature graphs prepared by these patients, at least three of every four provided useful information. A few patients lead very irregular lives, working, eating, and sleeping at odd hours, so that these abnormal physical, metabolic, and nervous stimuli mask the hormonal control of basal temperature fluctuations.

In general, it can be said that the estrogenic phase of the normal cycle is associated with a low level of the temperature and the luteal phase with an elevated level. The rise in the temperature about the middle of the average 27- to 31-day cycle occurs coincidentally with ovulation. The exact time of ovulation is still debatable; however, we have recently provided some evidence that it may often occur after the low level has been reached prior to the ovulatory rise, and as the rise is taking place. We have recently reported a group of women who conceived during the period when they were following ovarian activity by basal temperatures and, in at least one of every three, the fruitful coitus occurred simultaneously with the ovulatory rise. Gruelich removed corpora lutea from women during the period of transition from the estrogenic to the luteal phase in the temperature curve and found ovulation to have taken place during the rise.

We recently reported the artificial production of typical temperature curves in young women in whom the ovaries were removed for disease of the pelvic organs and in women with complete ovarian failure. Estrogens administered provoked no change in the level of the temperature but the introduction of progesterone was followed by a prompt rise in the level and its maintenance during the period of administration of this progestational hormone. These experiments provided further data as to the hormonal mechanism of these temperature fluctuations in women.

DR. PHILIP F. SCHNEIDER.—This presentation has been particularly interesting to me, and quite stimulating. Dr. Cooperman has approached it from the angle of temperature change. He has brought out certain points that I think are very significant. In a considerable experience with endocrine therapy I have become convinced that progesterone is the secondary hormone of the ovary, and that estrogen is the primary one. The reason that these fertility cycles occur in patterns is distinctly due to the estrogen. I would like to cite one case.

I saw a patient in September, 1935, who had come into the hospital originally in June, having missed her period by five days, and started hemorrhaging. The diagnosis of incomplete abortion was made. She was curetted, and instead of decidual tissue, a cystic glandular hyperplasia was found. We are all aware of the dictum that glandular hyperplasia is due to the unopposed action of estrogen. After curettage and the microscopic diagnosis, the patient was placed on antuitrin S, according to the suggestions of Novak. Five or six weeks later she was brought into the hospital again, hemorrhaging. She was curetted again, with the same findings of cystic glandular hyperplasia. Following her second curettage, she was placed on progesterone, with the same result, that in five or six weeks, bleeding again started. The patient was a woman of 32, with two children, and with a normal-sized uterus. Hysterectomy was contemplated at this time. This was not carried out, and at my suggestion the patient was put on estrogenic therapy, with the result that the bleeding stopped within ten to twelve days.

Approximately six weeks after the bleeding stopped, a biopsy was taken and an endometrium was found that was still slightly cystic, but beginning to simulate a proliferative endometrium. Three weeks later, after continued estrogenic therapy, a period occurred. Twenty-eight days later, another period occurred, starting abruptly, lasting four days, and stopping abruptly. Preceding the third menstrual period, an endometrial biopsy was taken and secretory endometrium was found, demonstrating that ovulation had occurred. This had all occurred as a result of estrogenic therapy only. On the basis of supplying estrogenic substance, a normal menstrual cycle was produced.

On checking the patient two years later, it was found that pregnancy had occurred within three or four months after the last biopsy was taken. Patient went through the pregnancy uneventfully, and delivered a normal child at term. Within six or eight weeks after delivery, the same continuous excessive bleeding occurred, and a vaginal hysterectomy was done. On checking the tissue and the laboratory report, it was found that the uterus had been normal in size, with no abnormality except the cystic glandular hyperplasia. This evidence would seem to indicate that undoubtedly the anovulatory bleeding occurring in adolescent girls is possibly also due to a deficient supply of estrogenic substance by the ovaries.

CAPILLARY FRAGILITY AND THE USE OF RUTIN IN TOXEMIAS OF PREGNANCY*

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RECENT studies on hypertensive patients have shown that approximately 18 per cent of them have an abnormal capillary fragility.[1, 2] We are interested in this condition because hypertension of varying degrees is found in over 8 per cent of our pregnant patients (pre-eclampsia, eclampsia, essential hypertension, and nephritis).[3] Approximately two-thirds of the patients who have an abruptio placentae before labor have an essential hypertension and, since the disease is characterized by the extravasation of blood between muscle fibers and beneath the visceral and parietal peritoneum, we wish to know if the primary hemorrhage is related to an abnormal capillary fragility. If the latter were found to be present, prophylactic treatment with rutin would be indicated.

Rutin, a rhamno-glucoside of quercetin, is a flavon derivative and its formula is very much like hesperidin. Hesperidin has been shown by Szent-Györgyi,[4] and later by Scarborough,[5] to have a beneficial effect on abnormal capillary fragility and since then has been used on such cases. A number of investigators have reported on the efficacy of rutin since Griffith[6] reported on 14 cases in 1944. This substance seems to be most promising in the treatment of increased capillary fragility,[6, 7, 8] in the thiocyanate therapy of hypertensive patients,[1, 7] in the hereditary hemorrhagic telangiectasia and in pulmonary and gastrointestinal bleeding of unknown origin,[7, 8] and perhaps in allergy,[7, 9] Rutin is preferred to hesperidin because it is more effective in smaller doses and so far no toxic symptom has been noted in laboratory animals or in patients.

Material and Method

A total of 164 cases of toxemias of pregnancy have been studied. In these patients both the positive pressure, Göthlin's Index,[10, 1] and the negative pressure, Hecht-Dalldorf[11, 12] tests were used. In normal individuals, the Göthlin's Index varies between 0 to 8 petechiae, 13 or more is considered abnormal, 9 to 12 is taken as borderline but still belongs to the abnormal group. In the Hecht-Dalldorf test, one or two petechiae at a certain negative pressure is considered the capillary resistance of that individual. One or two petechiae with a negative pressure of 20 to 25 cm. of mercury is considered normal.

In a high percentage of the cases, the two tests gave parallel results. In a few instances, the negative pressure test showed abnormal while Göthlin's Index was still in normal ranges. When capillary fragility was determined at a later date on the same patients, both tests were found abnormal.

*Supported in part by the Chicago Lying-in 50th Anniversary Research Fund for Eclampsia.

Results

Fig. 1 summarizes the results in these 164 cases of toxemias of pregnancy.

In the first group there are 75 hypertensive toxemia patients, in most of whom capillary fragility was determined once. A few were studied from two to five times during their pregnancy and early postpartum period. The group is subdivided into "mild" and "severe" hypertensive, depending upon their blood pressure, laboratory and clinical findings. Fifty-four were classified as

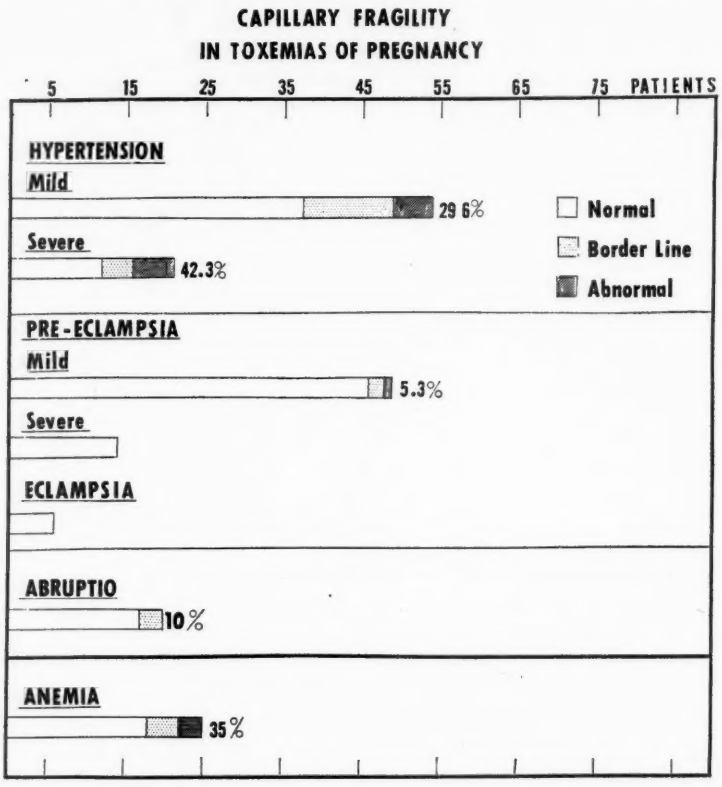

Fig. 1.

mild hypertensive; of this group, 29.6 per cent showed abnormal capillary fragility, 20.4 per cent of which were borderline, and 9.2 per cent definitely abnormal. In the severe hypertensive group of 21 cases, 42.3 per cent showed abnormal capillary fragility, of which 23.8 per cent were borderline and 18.5 per cent definitely abnormal. For the entire group, mild and severe, the total per cent of abnormal capillary resistance was 33.3 per cent. This is higher than the percentage reported by other investigators. Pregnancy might be a contributing factor, since some of the patients were normal to start with and the capillary resistance became abnormal as the gestation advanced. This brings out another point, that is, although in the severe hypertensive group the percentage was higher, abnormal fragility does not depend on the duration and the severity of the hypertension as Griffith has pointed out. Among the patients who showed normal capillary resistance, some had a history of hypertension of long duration. On the other hand, among the group that showed abnormal

capillary fragility, the blood pressure rise appeared in the latter part of the pregnancy. In this group, there were four patients with hypertensive encephalopathy, three of whom had a cerebral hemorrhage. The capillary fragility was borderline in two cases and normal in one. The fourth patient with clinical evidence of vascular spasm of the cerebral vessels had normal capillary fragility.

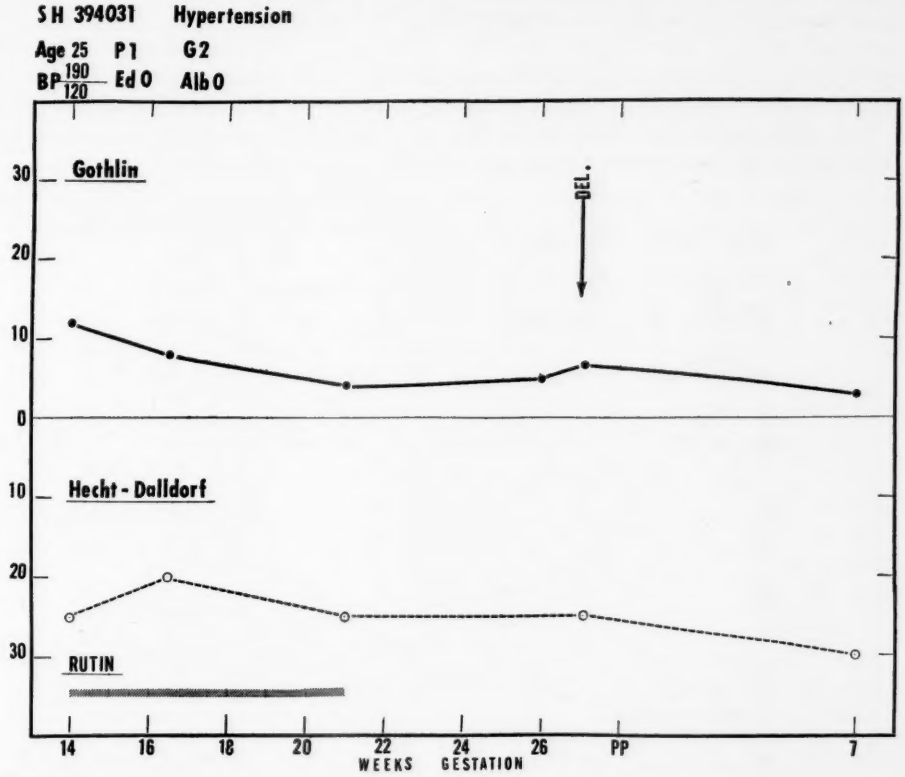

Fig. 2.—Göthlin scale indicates the sum of the number of petechiae occurring at 35 mm. of mercury pressure multiplied by two, and the additional number occurring at 50 mm. The Hecht-Daldorf scale indicates the negative pressure in centimeters of mercury at which petechiae first appear.

The second group of patients had pre-eclampsia. A total of 63 patients was studied, of these 49 had mild pre-eclampsia and the remaining 14 were severe cases. In the former group, three patients showed abnormal fragility, 5.3 per cent, but two of these patients had low cell volumes of 25 and 29 per cent on the day of the test. In Fig. 1 it is demonstrated that as high as 35 per cent of patients with anemia have abnormal capillary fragility. If this is taken into consideration, only one patient has an abnormal capillary resistance. This patient might have been hypertensive rather than pre-eclamptic. The rationale for this reasoning is the observations in the severe pre-eclampsia and eclampsia. None of the fourteen severe pre-eclamptics and the six eclamptics studied showed abnormal capillary resistance.

Twenty cases of abruptio placentae of varying severity have been studied. Only two patients, known hypertensives, showed borderline fragility. One of these cases is illustrated in Fig. 2.

This patient (H. S.), No. 394031, a known hypertensive, had borderline fragility at 14 weeks' gestation. She was given 20 mg. rutin three times a day. At 22 weeks' gestation, her capillary resistance was normal and she was taken off rutin. At 26 weeks, the capillary

fragility was still normal. At 27 weeks, the patient came in with vaginal bleeding and delivered a stillborn baby. On admission, the capillary fragility was normal. On her postpartum visit seven weeks later, the capillary resistance was still normal.

Thirteen pregnant women with abnormal capillary fragility were given rutin. The patients were started with 20 mg. of rutin three times a day and the fragility determined at intervals of three weeks. If no improvement was noted at the end of the first three weeks, the dose was doubled. After the capillary fragility index returns to normal ranges, the patients take 20 mg. three times a day until delivery. In pregnant hypertensive patients whose capillary fragility is abnormal, 60 mg. of rutin a day is insufficient, since in almost every case the dose had to be increased to 120 mg. per day. No toxic symptoms were observed with the amounts given. A few patients were given ascorbic acid in conjunction with rutin. We were unable to demonstrate any vitamin C deficiency in toxemias of pregnancy.[13]

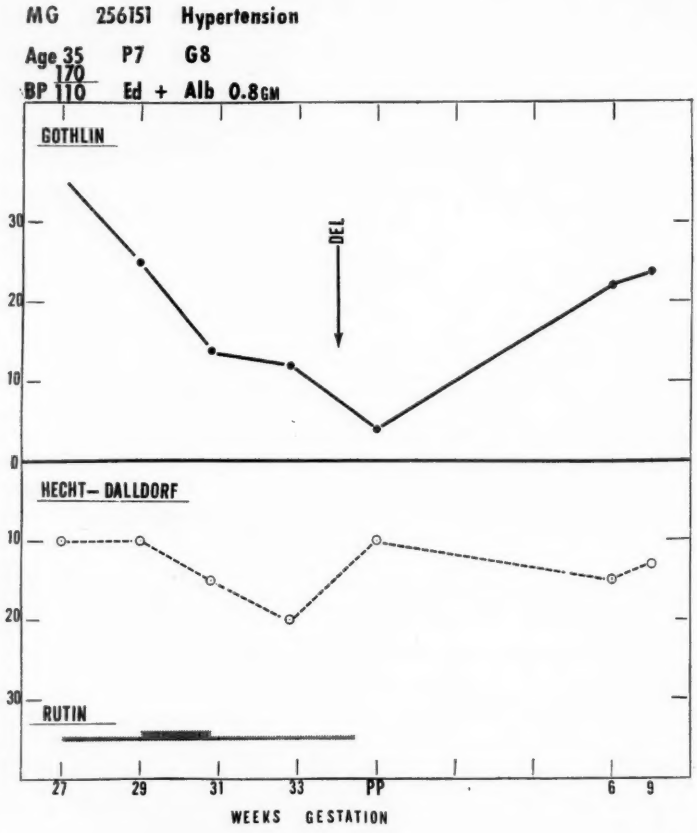

Fig. 3.

Of the 13 patients, two have not delivered. Twelve patients gave fair to good results. Fig. 3 is illustrative of one of these patients.

CASE 1.—M. G., No. 256151, a 42-year-old para vii, gravida viii, had hypertension with her last pregnancy in 1941. During this pregnancy, her blood pressure ranged between 148/84 and 190/100, proteinuria of 0.38 grams per 24-hour period and edema one plus. At 27 weeks' gestation, the capillary fragility showed marked abnormality. The patient was put on rutin, 20 mg. three times a day. Two weeks later another determination was done and the index was still high. Rutin was increased to 40 mg. three times a day. At 31 weeks' gestation, the capillary resistance was normal and rutin was reduced to 60 mg. per day.

Ten days later, the index was borderline with Göthlin and normal with Hecht-Dalldorf tests. At 34 weeks, the pregnancy was terminated by cesarean section, the patient delivering a 2,145 Gm. male infant. After delivery, no more rutin was administered. Eight days post partum, the Göthlin's Index was normal and the Hecht-Dalldorf test abnormal. At six and ten weeks post partum, the capillary fragility was found abnormal with both tests.

One patient not only did not respond but actually became worse in spite of the rutin.

CASE 2.—W. P., No. 411478, a 21-year-old para 0, gravida i, was first seen at 17 weeks' gestation. Clinical and laboratory findings were normal and the patient was placed on routine prenatal care. On her next visit, the blood pressure was 150/94. At 23 weeks' gestation, the capillary fragility was normal with Göthlin's Index and abnormal with the Hecht-Dalldorf test. At 33 weeks' gestation, the capillary fragility was borderline and the patient was given 120 mg. of rutin daily. At 36 weeks, the fragility was definitely abnormal.

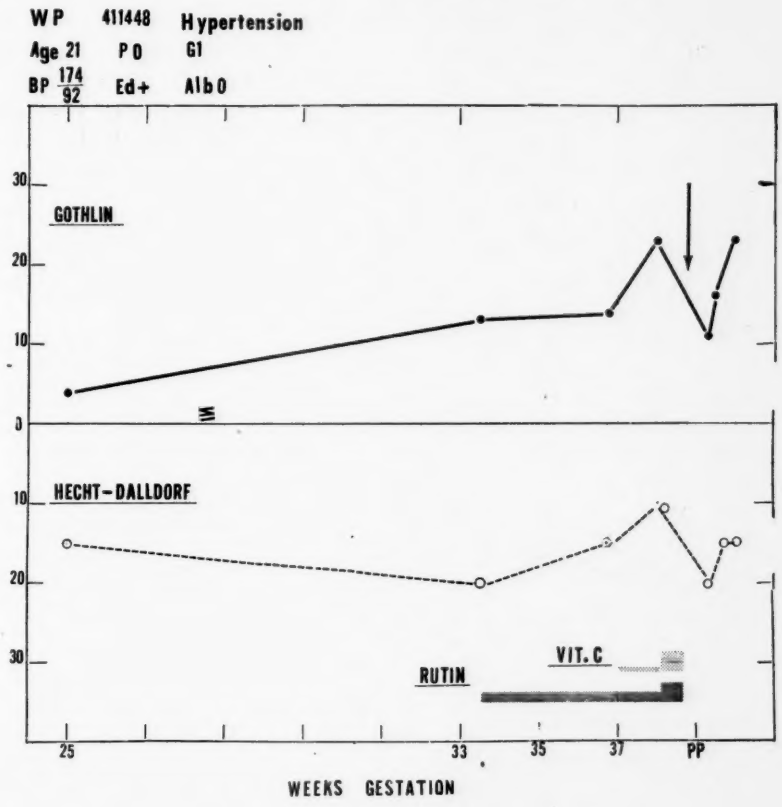

Fig. 4.

Vitamin C was also administered. At 37 weeks, the patient's blood pressure was 174/92, and her capillary resistance very much lowered. Both rutin and vitamin C were increased to 200 mg. a day, but two days later the patient went into labor and delivered a live female infant of 2,895 Gm. The capillary fragilitiy was determined during the early postpartum period and was found abnormal. Fig. 4 illustrates the results in this patient. In this instance, rutin at the dose given had no effect.

Summary

The capillary fragility, using both the positive and negative pressure tests, has been studied in 164 cases of toxemia of pregnancy.

Thirty-three per cent of the patients who we thought had essential hypertension in pregnancy had an increased capillary fragility. The duration or the severity of the hypertension seemed to be of no significance. Pregnancy seemed to accentuate capillary fragility, possibly because of the relative or absolute anemia.

Capillary fragility was not increased in patients who were thought to have preeclampsia, if the anemia was excluded.

Abruptio placentae does not seem to be associated with an abnormal capillary fragility.

Rutin was used in 13 patients, in 12 of whom it was found efficacious in reducing the increased capillary fragility.

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COMBINED EXTRAUTERINE AND INTRAUTERINE PREGNANCY

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COMBINED extrauterine and intrauterine pregnancy is an unusual obstetric complication. It is well to keep in mind the difference between combined and compound extrauterine and intrauterine pregnancy. The former connotes the existence of simultaneous pregnancies, whereas the latter term refers to the superimposing of an intrauterine pregnancy on a previously existing extrauterine pregnancy, usually a lithopedion.

Duverney,[1] in 1708, is generally credited with the first description of the combined type. Since this observation, several cases have been reported. A survey of the literature calls one's attention to the confusion in proper classification and overlapping of collected case reports. In 1940, Bernstein,[2] excluding the obvious compound type, collected 294 authentic cases. Ludwig[3] reviewed the literature through 1938 and reported a total of 352 cases. He did not, however, differentiate between combined and compound types. Mitra,[4] in 1940, stated that there had been not more than 304 cases of combined extra- and intrauterine pregnancy reported in the world literature. Studdiford and Speck,[5] in 1944, found 18 cases not included by Mitra and by combining these figures arrived at a total of 322 cases (they apparently did not include Mitra's two cases).

A review of the literature from the time of Studdiford and Speck's report in 1944 through October, 1947 reveals thirteen instances of combined extrauterine and intrauterine pregnancy.[6-18] To these, I wish to add one case of my own, and three other previously unreported cases from the Charity Hospital of Louisiana at New Orleans. This brings the total number of reported combined pregnancies to 341.

The 17 cases included in this paper were productive of nine living children born near or at term. In one instance, both the intrauterine and extrauterine fetuses were delivered living. There was one maternal death.

The patients who have been carried to term are not numerous. Gemmell and Murray[19] collected 81 cases which terminated in living fetuses. Morse,[20] in 1939, reported that there were 86 patients (including his own) who went to term and who were delivered of living babies.

The treatment of this condition is surgical, the majority of cases coming to the surgeon's attention early in pregnancy because of tubal abortion or rupture. It is in this type of case that the intrauterine pregnancy has the most favorable outcome. Unfortunately, the correct preoperative diagnosis is made in only four per cent to 9.3 per cent of cases.[21] When a diagnosis of a combined pregnancy is established or even suspected at operation, every precaution should be exercised to preserve the intrauterine pregnancy, especially if a single corpus luteum is excised. Several cases are on record where the extrauterine pregnancy has

TABLE I. CASES IN RECENT LITERATURE

AUTHOR	YEAR	GR..VIDA	AGE	DURATION OF PREGNANCY		OUTCOME
				EXTRA-UTERINE	INTRA-UTERINE	
King	1942	iv	33	2 months	"near term"	Rt. tubal abortion. Bilateral salpingectomy. Spontaneous delivery of living child. Mother recovered.
Lawrence and Elsmore	1943	iv	32	3 months	Term	Ruptured left tubal pregnancy. Left salpingo-oophorectomy. Spontaneous delivery of living term child. Mother recovered.
Horchler	1944	–	–	2 months (Bilateral tubal)	3 months	Bilateral tubal pregnancies removed at 2 mos. Patient aborted intrauterine pregnancy 1 month later. Mother recovered.
Andwandter and Rodriguez	1938	vii	33	6 weeks†	2 months	Ruptured left tubal pregnancy followed by dilatation and curettage for incomplete abortion. Mother recovered.
deMoraes Leme	1942	ii	29	3 weeks	Term	Unruptured early right tubal pregnancy. Intrauterine pregnancy continued to term. Spontaneous delivery of living child. Mother recovered.
Rabago	1943	viii	32	7 months	7 months	Laparotomy with removal of living extrauterine fetus and cesarean section for a living intrauterine fetus. Both lived 2 weeks. Mother recovered.
Howard	1943	i	28	2 months	7 months	Ruptured left ectopic pregnancy. Left salpingo-oophorectomy. Spontaneous delivery of living child at 7 months. Mother recovered.
Kohn and Burchard	1945	v	30	12 weeks	Twins— 8 months 5 months	Cesarean section for twin pregnancy, 8 months (stillborn) and 5 months (macerated). Left salpingo-oophorectomy for unruptured tubal pregnancy at time of section. Mother recovered.
Collier	1946	iv	38	2 months–	6 weeks	Dilatation and curettage for incomplete abortion. Bilateral salpingo-oophorectomy and hysterectomy for twin pregnancy of the tube one month later.
Belson	1945	iv	35	6 weeks	24 weeks	Removal of left unruptured tubal pregnancy. Delivered fraternal twin intrauterine pregnancy. Mother recovered.
Gruenewald	1945	vi	41	6 weeks	Term	Ruptured right tubal pregnancy. Right salpingo-oophorectomy. Spontaneously delivered living child. Mother recovered.
Powell	1945	i	25	2 months+	Term	Ruptured left tubal pregnancy. Left salpingo-oophorectomy. Spontaneous delivery of living child intrauterine. Mother recovered.
Acosta-Sison	1945	x	30	1 month	3 months	Right tubal abortion. Right salpingectomy. Aborted intrauterine fetus 1 month later. Mother recovered.
Michaels	1938	v	25	4½ months	3 months	Aborted intrauterine fetus. Left tubal pregnancy removed at laparotomy. Mother recovered.
Michaels	1943	ii	32	3 months	6 months	Patient expired from cerebral hemorrhage. Combined extrauterine and intrauterine pregnancy found at autopsy.
Michaels	1946	v	35	6 weeks	3 months+	Ruptured right tubal pregnancy. Right salpingo-oophorectomy. Aborted intrauterine pregnancy. Mother recovered.
Michaels	1947	iii	34	1 month	8 months+	Right tubal abortion. Right salpingo-oophorectomy. Cesarean section delivery of living intrauterine fetus. Mother recovered.

continued to progress along with the intrauterine pregnancy. This type of case poses a difficult approach to treatment and each case must be handled as an individual problem. Novak[21] reviewed nine cases in which both the extrauterine and intrauterine pregnancies progressed to term, and the fetuses were delivered alive.

The maternal mortality rate is surprisingly high. Gemmell and Murray,[19] in collecting 217 cases, noted that the series mortality rate amounted to 14.4 per cent if autopsy cases were excluded. Perhaps the more frequent employment of cul-de-sac puncture in suspected cases of tubal abortion or rupture would lead to earlier diagnosis of extrauterine gestation and, therefore, to early and prompt treatment. Replacing blood loss with immediate blood transfusions and the employment of sulfonamides and antibiotics to combat infection should aid materially in the reduction of maternal mortality. We believe it unwise to attempt removal of the placenta in abdominal pregnancy.

Report of Cases

In addition to the author's case (Case 1), a search through the records of the Charity Hospital of Louisiana at New Orleans for the last ten years produced but three additional authentic cases of combined extrauterine and intrauterine pregnancy. Since these latter three cases were not previously reported, they will be included in this paper. During the same period, Beacham[22] found 377 instances of ectopic gestation. The ratio of combined extra- and intrauterine pregnancies to ectopic is therefore slightly less than 1 per 100. This is in keeping with Martin and Meyer's[23] estimate of the occurrence of combined extrauterine and intrauterine pregnancies as 1 in 105 ectopic pregnancies.

CASE 1.—First admission. V. J. (T45-191515), Negro, aged 32 years, was admitted to Charity Hospital on May 1, 1947, complaining of lower abdominal pain and vaginal spotting. Menses had begun at 13 years, occurred every 28 to 30 days, and lasted four days. Her last normal period was believed to have occurred Feb. 16, 1947. She commenced to bleed vaginally on March 15, 1947, and continued to spot almost daily. Coincident with this, she complained of the onset of vague lower abdominal pains, most marked in the right lower quadrant. Four days prior to admission, the pain became worse and radiated to the right lumbar region. Nausea and vomiting had occurred during the onset, but had not been troublesome since. Obstetric history: gravida iii, para iii: 1935, forty-hour labor, difficult forceps delivery, dead baby; 1936, classical cesarean section for fetopelvic disproportion resulting in living 6 pounds, 8 ounce child; 1938, low cesarean section resulting in delivery of 8 pound, 7 ounce living baby. Stormy postoperative course.

On examination, the temperature was 100° F., pulse rate 88, respirations 18, and blood pressure 114/96. The patient did not appear acutely ill. Abdominal examination revealed the presence of supra- and infraumbilical scars. The abdomen was slightly distended and generally tender. Peristalsis was active and an orange-sized, ill-defined mass was thought to be present in the right lower quadrant. Pelvic examination revealed the following findings: no increase in vaginal heat, slightly softened cystic cervix, moderately tender on motion, with a small amount of bright-red blood issuing from the external os. Corpus was enlarged slightly, anteriorly placed, and mobile. An orange-sized, tender, cystic mass was present on the right, and the left adnexa was believed to be normal. No cul-de-sac fullness was noted. Catheterized urine specimen was negative. Hematocrit 23, sedimentation rate 31 corrected, white blood cells 15,000, 78 per cent polymorphonuclear leucocytes. Cul-de-sac puncture produced no old blood or exudate.

Impression.—Right tubal abortion with moderate intra-abdominal bleeding. At operation, when the peritoneal cavity was entered, approximately 800 c.c. of old clotted blood was found. There was no active bleeding. Intra-abdominal examination revealed normal-appearing left adnexa with an old tubal abortion present on the right. The uterus was soft and en-

larged to the size of a three months' pregnancy and the author believed he could palpate a fetus within the uterine wall. Despite the presence of a corpus luteum in the right ovary, a right salpingo-oophorectomy was deemed necessary because the presence of adhesions and friable tissue precluded the possibility of salvaging the ovary.

Pathologic Report.—Tube contains clotted blood and placental tissue. Ovary contains corpus luteum and few follicular cysts.

The patient was placed on progesterone, stilbestrol, vitamin E, and thyroid postoperatively. Convalescence was uneventful. Sutures were removed on the tenth postoperative day.

Follow Up.—June 6, 1947: Uterus enlarged to a three and a half or four months' pregnancy. No cramps or bleeding. July 25, 1947: History of twins on both sides of the family. Blood pressure 128/80, weight 120 pounds. Vertex right occipitoanterior, fetal heart tones 150 right lower quadrant. Pelvic: intraspinous 20 cm., intercrestal 23 cm., external conjugate 17.5 cm., diagonal conjugate 11.5 cm., conjugata vera 10 cm., sacrum curved, transverse outlet 8 cm., posterior sagittal outlet 7.5 cm. *Impression,* generally contracted pelvis, borderline.

On Oct. 14, 1947, patient was readmitted to the hospital because of signs and symptoms of mild toxemia of pregnancy. She responded well to bed rest, ammonium chloride, and mild sedation. Hematocrit was 28. Sickling preparation negative in twenty-four hours. Blood urea nitrogen 6.3. Serum proteins 6.51. Kline and Kolmer tests were negative. Rh positive, type O. On Nov. 3, 1947, a transfusion of 500 c.c. of whole blood was administered and a count later in the day revealed 11.0 Gm. hemoglobin, 4.3 million red blood cells, 6,200 white blood cells with 65 per cent polymorphonuclear leucocytes and 35 per cent lymphocytes. On Nov. 3, 1947, the height of the fundus measured 39 cm. An elective section was scheduled for the next day. The patient began to have regular uterine contractions at 1:30 P.M. on Nov. 4, 1947, and cesarean section resulted in the delivery of a healthy, 6 pound, 7 ounce male infant. There were no adhesions present at the site of removal of the previous right tubal abortion. No corpus luteum was noted in the left ovary. Five hundred c.c. of blood were administered during the operation. Recovery was uneventful and the patient and her baby were discharged on the tenth postoperative day.

Comment.—This case is representative of the usual chain of events which is seen in this condition. The onset of initial symptoms coincided with the suspected date of tubal abortion. The diagnosis of coexistent extrauterine and intrauterine pregnancy was made at the first operation. Despite removal of the corpus luteum in the right ovary, the patient progressed to term. The use of stilbestrol and progesterone postoperatively probably helped prevent abortion. Cesarean section resulted in the birth of a normal, healthy, 6 pound, 7 ounce boy at or near term.

CASE 2.—F. V. (T46-247314), Negro, aged 35 years, was admitted to Charity Hospital on Dec. 22, 1946, complaining of acute abdominal pain. Gravida v, para v, last pregnancy, 1944. Menstrual periods were noted to occur every 28 days, lasting 3 to 4 days. Last normal menstrual period occurred Oct. 25, 1946, and lasted for three days. On Nov. 28, 1946, scanty menses started and the patient spotted almost daily until time of admission. On Dec. 17, 1946, she developed intermittent, colicky pain in the lower abdomen and on Dec. 20, 1946, while in bed, was seized with a sudden severe cramping pain which in a short period of time radiated to the right shoulder and epigastrium. An evacuation of the bowels failed to relieve the pain. Thirty minutes later she vomited and the abdomen gradually became distended and tender.

On examination, the patient was found to be an obese, well-developed, and well-nourished woman who appeared acutely ill. The mucous membranes were pale, temperature 100.4° F., pulse rate 120, respirations 20, and blood pressure 140/80. The abdomen was distended and generally tender. Maximum rebound tenderness was found in the right lower quadrant, and a few peristaltic sounds were present.

Pelvic examination revealed the following findings; vagina cold; cervix soft, admitting tip of finger, tender on motion; corpus believed to be slightly enlarged, soft, and retrodisplaced; bilateral adnexal tenderness but no masses. Rectal examination revealed a boggy mass in the

cul-de-sac. A catheterized urine specimen was negative. Hemoglobin 8 Gm. hematocrit 23 per cent, red blood cells 2.66 million. Cul-de-sac puncture revealed presence of old blood. Preoperative diagnosis, ruptured tubal pregnancy.

The patient was taken to the operating room and a transfusion started. When the abdomen was entered, approximately 1,000 c.c. of old and fresh blood were encountered. Inspection of the pelvic viscera revealed normal-appearing left adnexa. The right tube presented a freely bleeding ragged opening in the distal one-third. Right salpingo-oophorectomy was done (a torn right infundibulopelvic ligament apparently necessitated the removal of the ovary as well as the tube). One of the surgeons remarked that the uterus appeared to have a pregnancy within. A total of 1,500 c.c. of blood were administered.

Pathologic Report.—Tube, chorionic villi present, hemorrhage, necrosis, and acute inflammation; ovary, corpus luteum present.

The patient was not put on any special medication and had an uneventful convalescence, going home on the eighth postoperative day.

Follow-up.—Feb. 14, 1947: On Jan. 15, 1947, the patient had severe cramps and bleeding, and passed a completely formed fetus, 7 to 8 cm. in length with cord and placenta. May 9, 1947: Uterus normal size. Patient discharged.

Comment.—This case was typical of a ruptured ectopic pregnancy. Cul-de-sac puncture was positive. She received early and prompt surgical treatment. Though one of the surgeons suspected that the uterus might contain a fetus, no special therapy (stilbestrol, progesterone, etc.) was administered. Since the pathologist reported a corpus luteum present in the removed ovary, one is led to believe that since the pregnancies were at an early stage its absence may have led to abortion of the intrauterine fetus. Large doses of estrogens and progesterone may have tided over the critical period, and the patient may possibly have gone to term.

CASE 3.—M. O. (I43-83883), Negro, aged 32 years, was admitted to Charity Hospital on May 14, 1943. She was gravida ii, para ii, her last child having been born in 1940. At this time she was noted to have had a severe toxemia. She had received one injection of bismuth salicylate in 1941. Patient appeared at this hospital on March 9, 1943, complaining of cramping pains in the lower abdomen of one week's duration. At this time, her last menstrual period was Nov. 31, 1942. In December, 1942, she had no menstrual period; in January, 1943, she spotted a small amount; and, in February, again did not menstruate. She complained of a sudden onset of cramping lower abdominal pains which would last ten minutes, and occurred approximately every 10 to 15 minutes.

Physical Examination revealed blood pressure 152/96, pulse rate 140, temperature 99.6° F. She was well developed and well nourished and appeared acutely ill. The positive physical findings at this time were a slight cardiac enlargement to the left, slight abdominal distention, and an orange-sized mass was palpated to the left of the midline. Tenderness and rebound tenderness were present in the lower abdomen.

Pelvic examination revealed the cervix to be displaced upward, and the cul-de-sac felt full and boggy. The impression at this time was a possible ruptured ectopic pregnancy versus tuboovarian abscess. An x-ray of the lower abdomen on March 23, 1943, revealed a large oval area of increased density extending from the third lumbar vertebra to the pelvis. No evidence of a fetus could be made out, but the ascending colon was displaced to the right. Another flat plate of the abdomen taken on March 26, 1943, was reported as suggesting a fetus in the pelvis. During this admission, she had a red blood cell count of 1.9 million with 22 per cent hemoglobin. Kline and Kolmer tests were strongly positive. She remained in the hospital under observation until April 1, 1943. Her final admission was on May 14, 1943, when she complained of weakness of her left arm and leg and swelling of the abdomen. Physical examination at this time revealed the blood pressure to be 160/90. The lower abdomen was distended, and fetal parts were questionably palpated in the left lower quadrant. Pelvic examination revealed the cervix to be displaced anteriorly. There was little tenderness

on manipulation of the cervix, but the cul-de-sac felt full and soft. Muscular weakness of the left upper and lower extremities was noted. *Impression,* Possible extrauterine pregnancy; hypertensive cardiovascular disease; generalized lues.

On May 16, 1943, an x-ray of the abdomen was reported as showing a fetus of approximately six months' gestation. On May 18, 1943, the patient was assisted to the bathroom, and on returning complained of pain in the back and abdomen. She immediately became comatose and expired in a matter of a few minutes.

Autopsy Report.—The uterus measured 21 by 18 by 9.5 cm. and contained a fetus weighing 650 Gm. Attached to the right side of the uterus and to its rear is a mass measuring 9 by 12.5 by 7 cm. This mass is dark red and soft. The cut surface of this mass reveals a double lumened cavity containing in its inner cavity a macerated fetus measuring 10.8 cm., crown to rump. The other cavity contains dark clotted blood. The patient apparently expired due to a massive cerebral hemorrhage.

Comment.—While clinically the supposition that an extrauterine pregnancy existed was entertained, the patient was treated conservatively only to expire from a cerebrovascular accident a few days after her last admission. The early diagnosis of extrauterine pregnancy might have been substantiated by a cul-de-sac puncture on her admission March 9, 1943. Apparently the intrauterine fetus was viable and might well have progressed to term had the patient lived.

CASE 4.—First admission. D. B. (T38-43675), Negro, aged 25 years, was admitted to Charity Hospital on May 5, 1938, complaining of weakness and severe abdominal pain. She was a gravida v, para iii, who last delivered six months prior to this admission. She nursed her baby for three months, and the last normal menses occurred on Jan. 28, 1938, to Feb. 2, 1938. Three weeks prior to admission she noted a gradual onset of cramping lower abdominal pain.

Physical examination revealed a well-developed, well-nourished, Negro woman who was not acutely ill. Temperature 102° F. Pulse rate 120, respiration 30, blood pressure 110/80. The abdomen was markedly distended and diffusely tender; however, no rigidity was noted. Pelvic examination revealed the following findings: relaxed perineum, increased vaginal heat, cervix chronically diseased and soft. An ill-defined mass was palpated, arising out of the pelvis. The adnexa were not identified. Urine, albumin O, sugar O, microscopically, few fine granular casts, occasional white blood cell. Hemoglobin 40 per cent, white blood cells 20,500, 85 polymorphonuclear leucocytes, 15 lymphocytes, smear for gonococci positive. *Impression,* acute pelvic inflammatory disease. Patient was treated with chemotherapy and on May 9, 1939, she spontaneously aborted a fetus and placenta.

Pathologic Report.—Specimen consisted of a fetus and placenta. The fetus measured 12 cm. in length.

The patient continued to maintain a septic course and was administered 500 c.c. of blood on May 21, 1938. Pelvic examination on May 25, 1938, revealed the uterus to be "enlarged to almost the umbilicus with several small fibroids." She was eventually discharged on June 14, 1938.

Second Admission. The patient was readmitted on July 19, 1938, much improved, with much the same findings as at the end of her previous admission. On July 22, 1938, a dilatation and curettage and laparotomy were performed. At operation, the surgeon, on entering the abdomen, discovered a pelvic mass situated in the midline and adherent to the peritoneum. This mass apparently arose from the left adnexa. A subtotal hysterectomy and bilateral salpingo-oophorectomy were performed. A large cystic mass was removed from the lower border of the liver.

Pathologic Report.—Cystic mass contained a fetus of approximately four and one-half months' duration surrounded by old hemorrhage.

Final diagnosis, tubal pregnancy, echinococcus (?) cyst of the liver.

Convalescence was uneventful and the patient was discharged on Aug. 1, 1938. Unfortunately she did not appear in the postoperative Clinic for follow-up.

Comment.—This case is a reversal of the usual findings. On her first admission, in addition to an acute specific salpingitis, she aborted a 12 cm. fetus. On her readmission two months later, a four and one-half months' tubal pregnancy was removed. A probable echinococcus cyst of the liver was also excised.

Summary

1. Four new instances of combined extrauterine and intrauterine pregnancy are reported.

2. The ratio of coexistent ectopic intrauterine pregnancy to ectopic pregnancy at the Charity Hospital during the last ten years is approximately 1 to 100.

3. At the time of operation for an ectopic gestation, one case (Case 1) was correctly diagnosed as a combined pregnancy and in one case (Case 2) this condition merely suspected. In both cases the corpus luteum was unfortunately sacrified. Case 1 continued to term, and a living child was delivered by cesarean section, while Case 2 aborted twenty-four days postoperatively. In such instances, substitution hormonal therapy should be instigated and maintained at least to the twenty-fourth week.

4. In approximately 25 per cent of the reported cases in the literature, one or occasionally both fetuses continued to term.

5. The reported maternal mortality is high. The following factors should materially aid in its reduction:

A. More widespread use of cul-de-sac puncture as an aid in the early diagnosis of ruptured ectopic pregnancy.

B. Avoidance of removal of the placenta of the abdominal twin.

C. Liberal and prompt use of whole blood and plasma in the emergency stages.

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OBSTETRIC EXPERIENCE IN A NAVY HOSPITAL*

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THERE is a widespread, and often well-founded, belief that the obstetric results of the small hospital, the military hospital, or the obstetric wing of a general hospital are less good than are those of the larger, one-purpose hospital. Therefore, it is incumbent on these smaller hospitals to subject themselves to periodic critical reviews in order to define and correct their deficiencies. This study is a review of the material and the results found in the Obstetrical Service of the U. S. Naval Hospital, Philadelphia, Pa., in 1946—a service that is small, military, and a part of a large general hospital. No statistical significance is claimed for the following figures. They are of interest only for the purpose of comparison.

During the year 1946, there were 614 women delivered of 618 babies, there being four sets of twins. There was no maternal mortality.

A study of the age groups indicates that Navy wives have their babies a little earlier in life than do other women. As shown in Table I, 67.5 per cent of our patients were less than 26 years old when delivered. The problems of the elderly nullipara and of the grand multipara were seldom encountered.

TABLE I. DELIVERIES BY AGE GROUPS

AGE IN YEARS	NUMBER OF PATIENTS	PERCENTAGE
16-20	112	18.2
21-25	303	49.3
26-30	136	22.1
31-35	54	8.8
36-40	8	1.3
41-45	1	0.16

The average number of days the patient remained in the hospital post partum varied a great deal from month to month, as shown in Table II. In the first half of the year the patient usually was out of bed on the seventh day and went home on the eighth. In April, her average stay was 9.2 days. In the latter third of the year earlier ambulation was instituted. The patient got out of bed on the fourth day and went home on the fifth. In September, the postpartum stay dropped to 5.5 days, and never rose to six days during the remainder of the year. No complications chargeable to early ambulation were noted.

TABLE II. POSTPARTUM DAYS SPENT IN HOSPITAL

MONTH	DAYS	MONTH	DAYS	MONTH	DAYS
Feb.	8.4	May	9.1	Sept.	5.5
Mar.	8.7	June	7.9	Oct.	5.8
Apr.	9.2	July	7.4	Nov.	5.9
		August	6.9	Dec.	5.7

*Presented at a meeting of the Philadelphia Obstetrical Society, Feb. 5, 1948.

For anesthesia, nitrous oxide, alone or in combination with ether, was the agent chosen for about two-thirds of the patients (Table III). Another one-fourth of them received ether alone. Pudendal block was found to be very satisfactory for the delivery of women with infections of the respiratory tract. Caudal anesthesia, effected by a trained anesthetist, was used twelve times but was not found to be suitable for general use in our patients. Spinal anesthesia was not used during the year in obstetrics. Practically all patients were given Demerol and scopolamine for analgesia. One patient developed bradycardia, which was thought to be due to the Demerol. She was given atropine, which did not relieve the bradycardia.

TABLE III. ANESTHETIC AGENTS

TYPE	NUMBER	PER CENT
Nitrous oxide, oxygen, and ether	350	57.0
Ether	156	25.4
Nitrous oxide and oxygen	40	6.5
Pudendal block	25	4.0
Caudal	11	1.8
Local infiltration	3	0.5
Local and ether	1	0.16
Caudal and local	1	0.16
Spinal	0	0.0
None	27	4.4

In interpreting morbidity, strict standards were observed (Table IV). Any patient whose temperature reached or exceeded 100.4° F. on any two days following delivery, excluding the first 24 hours, was considered morbid. Temperatures were taken five or six times a day. In patients in whom infection was both genital and extragenital, or in whom the site of the infection could not be determined, the morbidity was considered to be genital in origin. All pregnancies of twenty weeks or more were included. Adhering to these standards a morbidity incidence of 5.9 per cent was found.

TABLE IV. MORBIDITY AND ITS SOURCE

	NUMBER OF PATIENTS	PERCENTAGE INCIDENCE
Morbidity, total	36	5.9
Extragenital	14	2.3
Genital	22	3.6

Two and three-tenths per cent of the patients were considered to have extragenital causes for their morbidity. The remainder, 3.6 per cent, represent the true puerperal infections. One may view this figure with skepticism. Perhaps the series is too small for percentages to mean anything. Perhaps our patients leave the hospital before they have an opportunity to exhibit their morbidity. It is more likely, however, that an early attack with powerful therapeutic agents is reducing the morbidity rates. The urge to start the administration of penicillin or a sulfonamide or both to a patient who has shown one significant rise of temperature is just as strong in the Navy as it is in civilian practice. To find such a patient at morning sickcall, to see her complete her puerperium without another significant elevation of temperature, and to speculate on what her course might have been without that speedy treatment are not uncommon experiences.

Of interest also is a group of nine women who were known to have parametritis, endometritis, or abscess in the episiotomy, but who failed to meet the temperature requirements for morbidity.

Table V shows that 28.8 per cent of the deliveries were operative. There were no high forceps and no destructive operations. Of the ten midforceps, five

were done because of failure of the occiput to rotate anteriorly, two for cephalopelvic disproportion, one for inertia, one for constriction ring, and one for premature separation of the placenta late in labor. All of these ten babies survived, though one had an injury of the seventh cranial nerve. Of the twenty-one babies delivered by breech extraction, three did not survive. Two of them died in utero prior to the onset of labor and were so diagnosed on admission. The third died of tentorial tears with cerebral hemorrhage. Sixty-five and eight-tenths per cent of the patients who were delivered per vaginam had episiotomies.

TABLE V. METHOD OF DELIVERY

TYPE	NUMBER	PER CENT
Spontaneous	440	71.2
Low forceps	138	22.3
Midforceps	10	1.6
Breech extraction	21	3.4
Cesarean section	8	1.3
Version and extraction	1	0.16

The indications for cesarean section were varied, as shown by Table VI.

TABLE VI. INDICATIONS FOR CESAREAN SECTION

NUMBER	INDICATION
2	Placenta previa centralia.
1	Flat pelvis. Paranoia.
1	Severe, fulminating toxemia.
1	35-year-old nullipara, occiputoposterior, 19-hour labor with no progress, ruptured membranes.
1	Breech, generally contracted pelvis, large baby, 31-year-old nullipara.
1	Fetal distress due to short cord.
1	Previous section for cephalopelvic disproportion.

Operative procedures other than for delivery were few. Uterine packing was done only twice, manual removal of the placenta once, and labor was surgically induced four times. None of these procedures was followed by morbidity.

TABLE VII. OTHER OPERATIVE PROCEDURES

PROCEDURE	NUMBER	PERCENTAGE
Uterine packing	2	0.32
Manual removal of placenta	1	0.16
Surgical induction of labor	4	0.65

Complications of labor were not remarkable (Table VIII). There was one third-degree tear, and three tears of the cervix sufficient to warrant repair. Hemorrhage of over 500 c.c. occurred ten times, or in 1.6 per cent of the patients. Retained placenta was seen 3 times (0.48 per cent).

TABLE VIII. COMPLICATIONS OF LABOR

	NUMBER	PER CENT	LATER MORBIDITY
Third degree laceration	1	0.16	0
Cervical laceration, repaired	3	0.48	1
Hemorrhage over 500 c.c.	10	1.6	1
Retained placenta	3	0.48	0
Prolonged labor—over 24 hrs.	26	4.2	4
Membranes ruptured over 12 hrs.	17	2.8	1

Twenty-six patients, 4.2 per cent of the total number, were in labor over twenty-four hours. This reflects an unwillingness to interfere in a labor which is making some progress and shows no complication other than prolongation. These patients received supportive treatment and rest periods as indicated. The average length of labor in this group was 41 hours. Four, or 15.4 per cent, of these patients later showed morbidity. All of these 26 patients left the hospital with living and well babies except one. In that patient, the marginal one-fifth of the placenta separated prematurely late in labor and the baby could not be resuscitated after delivery.

In 17 of our patients (2.8 per cent) the membranes ruptured twelve hours or more prior to delivery. One of them (5.9 per cent) later exhibited morbidity. In one of them, there was an intrapartum fetal death of a child presenting by the face.

The complications of pregnancy are shown in Table IX. Placenta previa occurred four times. Two of the patients with this complication were delivered by cesarean section, one by low forceps, and one spontaneously. There were no fetal deaths associated with placenta previa. Premature separation of the placenta occurred eleven times. None of these hemorrhages was concealed or of a severe degree. Fetal death was associated with this diagnosis twice. One was an intrapartum death following separation of the marginal one-fifth of the placenta. The other death was due to immaturity, the patient being in the twenty-first week of her pregnancy.

TABLE IX. COMPLICATIONS OF PREGNANCY

CONDITION	NUMBER	PERCENTAGE
Placenta previa	4	0.65
Premature separation of placenta	11	1.8
Pre-eclamptic toxemia, mild	20	3.2
Pre-eclamptic toxemia, severe	2	0.32
Chronic glomerular nephritis	2	0.32
Hypertensive disease	1	0.16
Pernicious vomiting	2	0.32
Syphilis	4	0.64
Gonorrhea	1	0.16
Pyelonephritis	6	1.0
Rheumatic heart disease	7	1.1
Severe anemia	2	0.32

Twenty patients (3.2 per cent) had pre-eclamptic toxemia, mild. Two (0.3 per cent) had a severe pre-eclamptic toxemia. One of these had a fulminating type which, with her other findings, seemed to indicate delivery by cesarean section. No patient developed convulsions, and there was no fetal loss among the toxemia patients.

Pyelonephritis appeared in six patients (1 per cent). In one of these women, the fetus died in utero at 28 weeks. She went into labor spontaneously and delivered a macerated fetus.

Routine Kahn examinations showed four (0.64 per cent) patients to have syphilis. Each of these patients received eight million units of penicillin, followed by bismuth and Mapharsen. None of their babies showed evidence of congenital syphilis.

Rheumatic heart disease was found in seven patients (1.1 per cent). Two of these patients were Class 1 cardiacs, four were Class 2, and one was Class 3. The Class 3 patient and two of the Class 2 patients decompensated later in pregnancy or in labor. All patients with heart disease were under the joint care of cardiologist and obstetrician throughout pregnancy. They spent the last four to ten weeks of pregnancy in bed in the hospital. They were delivered per vaginam, under open-drop-ether anesthesia. They were allowed to go into labor spontaneously, with one exception. One patient developed a toxemia while on bed

rest in the hospital and labor was induced surgically. One patient went into labor prematurely at 31 weeks and delivered a baby which died in its neonatal period. No other cardiac patient lost her baby.

An obstetric report is not complete without some information concerning the infants delivered. (Table X.) In this series, no infant weighed over ten pounds at birth. Twenty-seven of them (4.4 per cent) weighed less than five and one-half pounds. Two of the twenty-seven had died antepartum at 24 and 28 weeks. Three of the twenty-five premature born alive died in the neonatal period. They were of 20, 24, and 30 weeks' gestation. Of the twenty-five prematures born alive, 88 per cent survived.

TABLE X. CONDITION OF INFANTS AT BIRTH

CONDITION	NUMBER	PERCENTAGE
Liveborn babies	611	98.8
Prematurely born	27	4.4
Injured at birth	4	0.6

There were seven stillbirths in the entire group of infants. This gives a liveborn incidence of 98.8 per cent. Four infants were injured at birth, for an incidence of 0.6 per cent. Two of the injuries were of the facial nerve and cleared up rapidly. One was a hemorrhage into the sternomastoid muscle, and it disappeared eventually. The fourth was tentorial tearing, with a fatal result.

Expressing certain facts (Table XI) in terms of live births has disadvantages, but for the sake of easy comparison two are given here.

TABLE XI. INFANT MORTALITY

	NUMBER	RATE PER 1000 LIVE BIRTHS
Stillbirths	7	11.4
Neonatal deaths	6	9.8

The stillbirth rate in our series was 11.4 per thousand live births, and the neonatal death rate was 9.8 per thousand live births.

In the literature of obstetrics are many studies of the obstetric results of our leading institutions. Most of them reflect painstaking care and honesty in their preparation. Newberger's three recent analyses of the obstetric activities of the entire state of Illinois are of great interest because of the large numbers involved. Comparison of our figures with those shown in similar studies indicates that it is possible for the small, military obstetric service to have results which compare favorably with those of well-regulated civilian institutions.

Discussion

DR. NEWLIN F. PAXSON.—The very excellent results that Dr. Smith presents are worthy of commendation. This is an example of what a full-time staff can do under the direction of a qualified specialist. We have been worrying about the possibility of government in medicine, and here we have an excellent example that it can produce excellent results and may easily be an argument for developing similar projects. I am interested to noted the high incidence of obstetric analgesia. At our institution, we have considerable trouble training the interns to give obstetric analgesia in every case. I noted that only seven of the total number failed to receive analgesia.

I was interested in noting that only one cervix was inspected and repaired. At Hahnemann, our policy has been routine inspection of all cervices, with repair of all tears except the small ones. This is in the nature of cancer prevention. I think, if the policy of routine inspections of the cervix was followed, we might find a higher incidence of repairs.

It was interesting to note the low incidence of operative interference. This is lower than we have in our own hospital. This may be because we teach routine outlet forceps whenever possible for two reasons: first, following the excellent paper by Aldridge in which the lower incidence of morbidity was reported, we believe it is a good procedure; and second, we are anxious to teach our interns this procedure as an introduction to obstetric surgery.

I was interested also in the low incidence of cesarean sections. We teach that cesarean section is the procedure of choice in placenta previa and placenta abruptio, unless the surgeon in charge feels that a conservative method can be carried through safely. I noted that there were four placenta previa cases and only two were sectioned, the other two delivered spontaneously, and there were no fetal deaths. Therefore, although I may disagree with general principles in the handling of these cases, I certainly must state that Dr. Smith's judgment has been vindicated by the results. Cesarean section in long labor might be worth considering. We do not consider long labor as an indication of cesarean section per se, although, if we found evidence of cephalopelvic disproportion, we feel that cesarean section is better than long tedious labor with injury to the child.

DR. SMITH (Closing).—We do not routinely inspect the cervix after delivery. It is inspected only when there is reason to question its integrity, as following breech extraction, midforceps, when bleeding is too free, etc.

That the operative incidence is too low is a valid criticism. Late in 1946, it began to increase, and stayed higher through 1947. The institution of resident training seemed to correspond with the beginning of the increased operative incidence.

Three factors enter into an explanation of the low cesarean section rate. One is an almost complete freedom from any pressure from husbands, mothers, or other interested parties. The second is a rather conservative view of obstetrics in general. Third, it is a very small series of deliveries. No doubt a larger series will show an increased rate.

Few of the prolonged labors were considered to be trial labors. Cephalopelvic disproportion had been considered earlier in labor and usually had been eliminated as a possible cause of the prolongation.

A REPORT ON 159 THIRD DEGREE LACERATIONS

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DURING the period January, 1942, to July, 1947, there were 9,170 deliveries at this hospital, and 159 patients who delivered vaginally sustained third degree lacerations. There is an aura of catastrophe in the eyes of the house staff when this complication occurs. This feeling has led us to analyze our series of cases so that a proper perspective as to etiology, prophylaxis, repair, and sequelae may be attained.

Third degree tears are confusingly defined in the standard texts, and various clinics. Davis[1] describes it as follows: "If a tear extends through the sphincter ani into the rectum it is a third-degree laceration." DeLee[2] states that "when the sphincter muscle and anus are involved these are designated as third degree or complete lacerations." Stander[3] describes the condition in the following manner: "In third degrees, the tear extends completely through the perineal body and the sphincter ani muscle, and for a certain distance up the anterior wall of the rectum. These are designated as complete in contradistinction to those of the first and second degrees—the incomplete tears in which the rectum is not involved." Curtis[4] states "Tears are classified as complete or incomplete according to whether or not the external sphincter is involved." In a later text[5] he clarifies it as follows: "Tears may be incomplete or may extend as far as the anus with destruction of the internal fibers as well as the external fibers, and some of the levator ani fibers which support the rectum. In the latter instance there is a complete laceration—" Wharton[6] words the definition: "If a tear goes through the sphincter ani muscle it is a third degree tear. If it extends through the whole perineal body from vagina to the rectum (it may also extend into the rectum) it is a third degree tear." The *Standard Nomenclature of Disease*[7] enhances the confusion by calling it "Laceration of the perineum involving the sphincter ani (complete tear)." In this area the three medical schools call involvement of any tissue deep to the sphincter capsule a third degree laceration. This paper defines a tear through or into the sphincter as an incomplete third degree tear, and those that enter the anus or rectum as a complete third degree. The division, because the latter involves an infected area and the former does not, is suggested for a standard classification.

Curtis and Anson[8] point out that in an anatomic dissection of the perineum there is a tendency for the constituent elements to become intermingled. Muscular layers become aponeurotic or fascial. Ligaments fuse with coverings of large vessels and fascial coats of organs. However, the outer layers are mostly muscular. Martius[9] divides the perineum into three layers. The innermost is the levator ani; the middle layer is the urogenital diaphragm; the outer layer is the sphincter muscle of the anus and anteriorly the bulbocavernosus muscle. These two muscles form a figure eight crossing in the midline at the connective tissue plate called the perineum.

DeLee[10] in describing the pathogenesis of these injuries, believes that the muscle suffers less actual injury than the fascia. It is the destruction of the fascia that allows the muscle bundles to fall into new arrangements, thus changing the point of attachment to the vagina, rectum, and anal sphincter. When the perineal body is torn, the urogenital septum is destroyed. The anterior wall of the vagina sags. The posterior wall rolls out, and the introitus is permanently open. Dwight Van Dell,[11] in a discussion of pathogenesis of third degree tears, states that pressure on the perineum and its lack of retraction with its subsequent anemia and tenseness lead to this injury. The levators give and, because of its firm attachment to the sphincter ani, expose the latter to the full force of the fetal mass. In incomplete tears only repair of the urogenital diaphragm and sphincter ani will control the sphincter action of the bowel. These maintain continence under pressure.

The perineum has two functions. It guides the flexing head until the occiput stems under the symphysis. This is followed by its stretching to insure necessary extension. This stage of the delivery has been treated by various methods. Manual dilatation of the perineum has been used for many years. DeLee[12] points out the following in a discussion of this procedure: "Manual dilatation of the perineum led to an intact mucosa but the underlying fascial layers stretched and separated causing the common injury of parting of the two levator pillars as they embrace the rectum; the few Lushka fibers and the intercolumnar fascia being torn resulting in a diastasis similar to that of the rectus abdominis muscles." However, it did fulfill the extension function of the perineum. The procedure next used was episiotomy after flexion of the head. This procedure, along with the Ritgen maneuver, certainly helped to prevent the mechanical forces that go to create relaxed perinea. Episiotomy had therefore obviated the perineum's extension function. With the onset of prophylactic forceps both functions were practically excluded. The perineum previously serving as a barrier subject to the geometry of forces was almost completely disregarded.

Material Studied

Table I illustrates the distribution of third degree lacerations in this series. One hundred fifty-nine or 1.63 per cent of the total deliveries sustained third degree tears. Of these, 59 or 0.62 per cent were complete, and 100 or 1.01 per cent were incomplete. Its occurrence according to gravidity is noted. Waters[13] reports twelve cases of third degree laceration after median episiotomy of 373 deliveries, an incidence of 3.2 per cent.

TABLE I. INCIDENCE OF THIRD DEGREE LACERATIONS

	DELIVERIES	THIRD LACERATION	COMPLETE	INCOMPLETE
Primigravida	3,022	148 or 4.9 %	54 or 1.7 %	94 or 3.1 %
Multigravida	6,148	11 or .15%	5 or .08%	6 or .09%
Total	9,170	159 or 1.63%	59 or .62%	100 or 1.01%

Etiology

Causative factors are divided into maternal, fetal, labor, delivery, and operative. The etiology has been outlined during these many years of obstetric history. It is our hope to point them out as we found it. In our analysis, some of these causes assume less significance, some more.

A. *Maternal Factors.*—The average age of this group was 22 years. Table I illustrates the fact that third degree laceration is usually a complication of primigravida. The previous obstetric history in the multigravida series revealed

that one patient had had a sphincter tear ten years prior to the complete tear sustained during the period of this series. Another had had a previous low forceps delivery of a 6 pound 2½ ounce infant with no tear. This time with a normal spontaneous delivery of a 6 pound infant, an incomplete third degree laceration was sustained.

Of every fifteen patients admitted to our antepartum clinic, one is a potential bony-pelvis-dystocia problem. It was noted that of the 159 third degrees 43 cases or 27 per cent of the series had clinical abnormalities of the bony pelvis. Thirty of this group had obvious contraction at the outlet, with a narrow pubic arch. The ratio of bony pelvic contraction of one to fifteen in the antepartum clinic compared to one to 3.5 in this group leaves very little question about consideration of the contracted bony pelvis as an etiological factor. This high percentage of abnormal pelves as a cause attains more significance if one considers the fact that the trained resident staff delivered 20 of these, while the interns delivered twenty-three.

B. *Fetal Factors.*—The average weight of infants delivered in this series was 7 pounds 1 ounce, or 3,200 grams. It is estimated that the average sized baby delivered at this hospital is 7 pounds 8 ounces, or 3,400 grams.

C. *Labor, Delivery and Operator.*—DeLee points out that prolonged labor causes edema of the perineum, making it more friable. Thirty-one, or 19.5 per cent, of these cases had labor longer than twenty-four hours. This proportion far exceeds the number of prolonged labors in the remainder of the deliveries.

Table II attempts to show the various positions of the fetus as found by the designated authors. Our series showed no position to be excessive. The distribution is such that we find it necessary to discount position as a serious cause of third degree lacerations.

TABLE II. POSITION AS A CAUSE

	OUR SERIES	WILLIAMS[14]	DE LEE[15]
Total	159	6877	35,179
LOA	46 %	54 %	
ROA	28 %	25 %	
LOP	3.1 %	9 %	
ROP	7.5%	12 %	52.7 %
Breech	3.8 %	3.9%	4.2 %
Face	.6%	.6%	.33%

Tables III and IV evaluate the operator and operative procedure. Obviously the greatest percentage of tears occurred in the low forceps deliveries. The resident on obstetrics delivers about half as many as the intern by low forceps. This proportion tallies with the amount of third degree tears each sustained. Although low forceps is an important cause of third degree tears, it seems as though the skill of the operator at the hospital staff level does not prevent this condition.

Of this group 142 had median episiotomies; fourteen had mediolateral, and three patients had none. Obviously median episiotomies are precursors of third degree tears. However, the literature on median episiotomies attempts to justify its use. Phaneuf[16] states that they are easier to repair and if anatomically brought together leave a more elastic perineum. The third degree that develops frequently with this type of perineum can be prevented by continuing the episiotomy to encircle the anus. He points out that rectoceles rarely occur after complete laceration of the perineum. This tends to prove that it is not the perineum that is responsible for this defect, but rather the stretching and relaxation of the fascial structures of the posterior vaginal segments. Barrett[17] emphasizes the fact that lateral episiotomies cause greater deformity and a more difficult

repair. The thin fibers of the levators retract and are more difficult to approximate. Campbell[18] believes that sometimes extensive mediolateral episiotomies cut the fibers of Lushka that suspend the rectum from the levators. Rectocele later occurs with the stress and strain of defecation and further childbearing. He finds that median episiotomies allow for a repair of the perineal body in a manner that brings the levator ani into their normal position. To him episiotomy exposes lacerations and makes it accessible for primary repair. DeLee repeats the same principle when he says that all episiotomies prevent further tearing and allow visualization of tissue for a proper anatomic repair.

TABLE III. TYPE OF DELIVERY AS A CAUSE

	SPONTANEOUS DELIVERY	LOW FORCEPS	MIDFORCEPS	BREECH
Total	6202	1886	259	362
Series	22	123	8	6
Per cent of total	0.35%	6.5%	3.09%	1.93%

TABLE IV. OPERATOR AS A CAUSE

	INTERN	RESIDENT
Spontaneous delivery	19	3
Low forceps	71	30
Midforceps		8
Low forceps rotation	8	14
Breech		6
Total and per cent	98 or 61.2%	61 or 38.8%

Campbell[18] postulates that at the stage where extension in delivery occurs the perineum has to be relaxed. If intense spasm occurs as is often produced by light anoxic anesthesia, lacerations comparable to direct violence may result. Our series points out that the highest percentage occurred in those who had pudendal block for delivery. Here the uterine contractions and the perineal pressure developed factors that could not be controlled by the operator. General anesthesia gave the best results. Local and regional anesthesias with the patient awake are effective for low forceps deliveries only when all perineal pain is relieved. The pudendal block does not provide this anesthesia while the caudals and spinals do. When a third degree occurs in the latter and general anesthesias, the conduct of delivery may be entirely at fault.

TABLE V. TYPES OF ANESTHESIA AS A CAUSE

ANESTHESIA	TOTAL	NUMBER AND PER CENT OF THIRD DEGREE LACERATIONS
None	5460	14 or .32%
Gas-oxygen-ether	1474	46 or 3.1 %
Gas-oxygen	861	24 or 2.8 %
Pudendal	835	68 or 8.1 %
Caudal	90	3 or 3.3 %
Spinal	77	4 or 5.2 %

Repair and Postoperative Care

The repair and postoperative care at this institution follows the plan suggested by Royston.[19] Chromic catgut 00 or 000 on an atraumatic needle is used. A suture is started at the angle of rectal tear submucosally. This is brought down in this layer to the mucocutaneous junction where it is locked and put aside to be used in the subcuticular stitch for the perineal skin. A second suture

begun at the upper angle runs down the perirectal fascia to the capsule of the sphincter ani. By everting the caught sphincter ani muscle this suture can be used to approximate the posterior fascia of the capsule. The sphincter is then brought together by two mattress or two interrupted catgut sutures. When this is accomplished the anterior layer of the capsule is closed by carrying the fascial suture forward. A routine episiotomy repair then follows.

The postoperative care is simple. It consists of the following:

1. Low residue diet.
2. Mineral oil.
3. Carlsbad Salts or Phoso-Soda drams one as soon as tolerated after delivery, and four times a day after that.
4. Heat lamp to perineum twenty minutes, twice daily.
5. If there has been no bowel movement by the third day: (a) Oil retention enema drams three given with a rubber catheter size 20. (b) Soap suds enema in 4 hours if oil has not been expelled.

Follow-Up

Of the 159 patients, there were 26 who ran a moderately morbid course. The infection above in no way affected wound healing. There was only one perineum that healed poorly. Postpartum observation at six weeks and up to five years on 134 cases revealed healed perinea with no symptoms. One hundred fifteen of these had a notation on their records to the effect that there was good sphincter tone and control. The several cases whose charts evidenced trouble are outlined as follows:

CASE 1.—The perineum was healing poorly at the time she signed out of the hospital. She was never seen again.

CASE 2.—At delivery because of a severely bleeding hemorrhoid, this patient was packed tightly and tissue approximated by hemostatic sutures. A secondary repair was done at a later date.

CASE 3.—The patient reported incontinence of gas during the second pregnancy, but was asymptomatic before and after that delivery.

CASE 4.—The patient had a poor result after the first repair. A secondary operation was done at a later date.

Nineteen of these patients had subsequent deliveries at this hospital. The operator was not aware of the previous history and took only usual delivery precautions. There was no repetition of the third degree laceration. Of these patients, four had median episiotomies. Four had second degree lacerations. One had a right mediolateral episiotomy. The remainder delivered with intact perinea. In contradistinction to secondary repairs of lacerated perinea these patients can deliver from below without recurrence. Barrett[20] believes a cesarean section should be performed in order to prevent recurrence. Ernall and Ferteta[21] in a study of 205 surgical repairs of complete lacerations, state that of 39 subsequent pregnancies, 21 had recurrence of the tear. The operator was unaware of the previous injury and did not guard the perineum at delivery.

Summary and Conclusions

1. One hundred fifty-nine cases of third degree lacerations are presented.
2. A classification of third degree lacerations is recommended for standard use: incomplete if only the sphincter is involved, and complete if in addition the rectum is also entered.
3. Anatomy and physiology of the perineum are discussed and the pathogenesis is suggested.

4. The use of median episiotomy is recommended and its use justified despite its association with third degree lacerations.

5. Causes of third degree laceration such as contracted outlet, size of fetus, position, anesthesia, forceps are analyzed.

6. A simple repair and postoperative treatment is outlined.

7. The follow-up on this series, though incomplete, is sufficient evidence that all fears may be allayed in the treatment of third degree lacerations. As long as an accurate anatomical repair is performed the results will usually be good.

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APPENDICITIS OCCURRING DURING PREGNANCY

A Diagnostic Review of 200 Cases

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THE subject of appendicitis as it occurred during pregnancy presented certain findings which, when recognized, may eliminate operation in many cases and save life in the occasional instance.

The material presented here was obtained through the courtesy of four hospitals in Detroit, Mich. Receiving Hospital is a municipal institution that has no obstetric service. Woman's Hospital devotes one-half of its services to obstetrics. Grace and Harper Hospitals are general hospitals and support active obstetrical services.

For the purpose of discussion, this series was divided into the following groups. (Table I.)

TABLE I. GROUPING OF CASES FOR DISCUSSION ACCORDING TO TISSUE DIAGNOSIS

1. Acute (catarrhal, gangrenous, gangrenous with general peritonitis)	52
2. Nonacute	125
3. Interval operation (not discussed)	2
4. Discharged without operation	21
Total	200

The number of cases was inadequate for statistical study; however, certain trends were presented. Table II demonstrated that pregnancy and appendicitis were more common in the early age groups. Table III presented a definite suggestion of seasonal occurrence in the acute cases. The nonacute cases were spread evenly throughout the year. This would be expected if the lower abdominal pain often associated with pregnancy was confused with the pain associated with acute appendicitis. Table IV indicated that the acute cases occur throughout the pregnant state as one would expect if there were no relationship with pregnancy per se. In the last trimester there was only one case in the "nonacute" group.

TABLE II. AGE VERSUS APPENDICITIS AND PREGNANCY

	UNDER 20 YEARS	20 TO 25 YEARS	26 TO 30 YEARS	31 TO 35 YEARS	OVER 35 YEARS	NO RECORD
Acute	5	20	19	5	2	1
Chronic	19	69	32	15	13	0

TABLE III. SEASONAL OCCURRENCE OF ABDOMINAL SYMPTOMS

	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.	NO RECORD
Acute (52)	4	8	2	5	0	3	0	5	8	4	4	7	2
Nonacute (125)	11	8	12	11	11	10	8	12	9	10	12	11	1

TABLE IV. MONTH OF GESTATION VERSUS OPERATION

	1	2	3	4	5	6	7	8	9	NO RECORD
Acute (52)	0	9	12	8	7	6	5	1	3	1
Nonacute (125)	1	48	27	17	6	8	1	0	0	17

Anamnesis

An analysis of the "acute" cases showed that the most important aspect of diagnosis was an accurate history. There was evidence of a sudden onset of symptoms in 41 cases. In the remaining 11 cases, abdominal cramps lasted from one to two days. Generalized abdominal cramps were present in 45 cases. Cramps were present over the right lower quadrant in six cases and over the lower abdomen in one case. There was spot localization of pain in 50 cases and no localization in two cases. In the two cases not complaining of spot pain, there was a positive psoas sign. Additional complaints were found in eight cases. (Table V.)

TABLE V. HISTORY

ACUTE CASES (52)			NONACUTE CASES (125)		
Onset:	Sudden	41	*Onset:*	Sudden	0
	Prodromal (1-2 days)	11		"Short time"	44
				2 days ±	12
				1 week ±	21
				1 month ±	48
Cramps:	Generalized	45	*Cramps:*		0
	Right lower quadrant	6			
	Lower Abdomen	1			
Localization:	"Spot"	50	*Localization:*	"Spot"	0
	No	2	*Prominent complaints:*	Pain right lower quadrant	70
	Psoas sign	2		Abdominal pain	23
				Nausea and vomiting	54
				Vaginal bleeding	8
Other Complaints:	Diarrhea	5	*Other complaints:*	Vaginal discharge; menstrual pains; malaise; diarrhea; backache; dizziness; dysuria; costo-vertebral pain	
	Protracted vomiting	2			
	Vaginal bleeding	1			

Comment.—The anamnesis of acute appendicitis evolves about a triad of events. First, there is the sudden onset which occasionally may be preceded by a period of vague gastrointestinal symptoms. Secondly, there are crampy pains projected over an area of the abdomen, usually associated with some degree of nausea and/or vomiting, which can be described as the peristaltic phase of the disease. These cramps cease before the third phase is fully developed. The third phase is the localization of a steady, dull pain definable by the tip of the patient's finger and may be termed the phase of peritoneal irritation. This triad indicates the presence of acute appendicitis with few exceptions, regardless of any contrary physical or laboratory findings. In the rare instance, an acutely inflamed low-lying gall bladder or Meckel's diverticulum may give a similar picture.

Abdominal Examination

Physical examination of the patients in the "acute" series revealed an interesting lack of findings. Only 9 cases presented rectus or abdominal wall spasm. The records of 18 cases made a special note that no muscular rigidity was present. Local pain over McBurney's point was present to palpation in

only 27 cases. Rebound tenderness, pain in upper right quadrant, Rovsing's sign and psoas sign were the other palpatory signs mentioned. It was apparent that the usual physical signs were poorly demonstrable or absent in about one-half of the cases. The displacement of the appendix by the enlarging uterus does not present the complete answer. (Table VI.)

TABLE VI. PHYSICAL EXAMINATION

ACUTE CASES (52)		NONACUTE CASES (125)	
Muscle spasm	9	Muscle spasm	3
"Spot" pain	27	"Spot" pain	0
Rebound tenderness	8	No record on chart	14
Right upper quadrant pain	1	Mass recorded	10
Rovsing's sign	1	*Other signs:* Bilateral abdominal pain; lower abdominal pain; distension; rebound tenderness	
Psoas sign	2		

An analysis of the "nonacute" cases revealed that no case presented a history sequence of sudden onset, abdominal cramps, and localization of pain. Four cases presented abdominal pain followed by localization over McBurney's point that could be suspected of acute disease.

The duration of the abdominal pain was of interest. In 44 cases, the duration was not mentioned but was probably short; 48 cases had pain one month or longer; 21 cases had pain one week or more; 12 cases had pain two days or more.

Prominent complaints in order of their frequency are shown in Table V.

Abdominal examination of the "nonacute" cases revealed no instance of finger-tip localization of pain. Slight pain on deep palpation over McBurney's point or the right lower quadrant was mentioned in 49 cases; the absence of pain was recorded 26 times; no record on chart in 14 cases. A mass was noted on the chart in 10 cases. Bilateral abdominal pain, pain in lower abdomen and in the gallbladder region, right rectus spasm, rebound tenderness and distention were mentioned in two or three instances each. (Table VI.)

Blood Counts

The blood pictures were limited to simple blood counts. They were found to be unreliable as diagnostic sides. A group of 51 cases of acute appendicitis had recorded blood counts which ranged from 8,000 to 31,000 total white cells per c.mm. In approximately one-third of these cases, the white cell count was below 14,000 per c.mm. The polymorphonuclear counts ranged from 68 per cent to 95 per cent. In two-thirds of these cases the "poly" count was 80 per cent or less.

There were records of blood counts in 89 cases in the "nonacute" group. In two-thirds of the cases, the total white cell count ranged from 6,000 to 12,000 cells per c.mm. and the polymorphonuclear count was between 60 per cent and 80 per cent. In the remaining one-third, the total count rose as high as 23,000 cells per c.mm. and the differential polymorphonuclear count as high as 95 per cent. (Table VII.)

TABLE VII. BLOOD COUNTS (WHITE AND DIFFERENTIAL)

ACUTE (51)	NONACUTE (89)
Total counts 8,000 to 31,000	Total counts 6,000 to 23,000
33 per cent below 14,000	66 per cent 12,000 or below
Polymorphonuclear 68 per cent to 95 per cent	Polymorphonuclear 60 per cent to 95 per cent
66 per cent were 80 per cent or less	33 per cent were 80 per cent or more

Cases Discharged Without Operation

A group of twenty-one cases were admitted to the hospital with a diagnosis of acute appendicitis but were sent home after a period of observation. Five of these cases presented a definite history of active appendicitis; they should have been operated upon promptly, in my opinion. Accurate evaluation of the condition of the appendix by any diagnostic means at our disposal is not reliable in cases of pregnancy. Postponement of operation may be extremely dangerous, while early operation is relatively safe. One of the cases presented here was followed by repeated blood counts, a notoriously inadequate procedure as this paper demonstrates. A brief résumé of the case histories of the challenged cases are as follows. (Case reports Nos. 1, 2, 3, 4, 5.)

"Missed Diagnosis"

A group of fifteen cases presented problems of differential diagnosis as they were encountered in this study. The appendix was removed incidentally after the true diagnosis had been made at operation. Eight cases involved a consideration of ectopic gestation, of which five cases had a preoperative diagnosis of tubal pregnancy which was not confirmed; one case was a hematoma following ruptured ectopic pregnancy that was diagnosed as appendiceal abscess; one case was a true ectopic pregnancy diagnosed as acute appendicitis; one case was a missed abortion diagnosed as ectopic.

There were three cases in which the tumor of pregnancy was diagnosed as an ovarian cyst and two cases were diagnosed as fibroid uteri. One case of acute right lower lobar pneumonia with referred abdominal pain and two cases of acute pyelonephritis were operated upon for acute appendicitis. (Table VIII.)

TABLE VIII. MISSED DIAGNOSIS (15). APPENDIX REMOVED AFTER CORRECT DIAGNOSIS WAS MADE

PREOPERATIVE DIAGNOSIS	POSTOPERATIVE DIAGNOSIS	
(1) Acute ectopic pregnancy	Normal tubes	5
(2) Acute ectopic pregnancy	Acute appendicitis	1
(3) Acute ectopic pregnancy	Missed abortion	1
(4) Acute appendicitis (abscess)	Hematoma	1
(5) Ovarian cyst	Central pregnancy	2
(6) Fibroid uterus	Central pregnancy	2
(7) Acute appendicitis	Acute lobar pneumonia	1
(8) Acute appendicitis	Acute pyelonephritis	2

Mortality

The mortality in the entire group was 2 per cent; in the "acute group" it was 7.7 per cent. It is conceivable that all deaths could have been prevented by the courageous and prompt action of the patient and physician. Early consultation with the abdominal surgeon would seem advantageous. A short résumé of each case is presented. (Cases 6, 7, 8, 9.)

CASE 1.—B 25400, white, 21 years old, primipara.

History.—Abrupt onset of epigastric cramps, continuous vomiting, obstipation, localization of pain in right lower quadrant.

Examination.—Right rectus spasm; deep pain over McBurney's point; temperature 98.2° F.

Laboratory.—White blood cells 11,700; polymorphonuclear leucocytes 78 per cent.

The attack subsided; discharged.

CASE 2.—B 25913, white, 23 years old, primipara, 3½ months' gestation.

History.—Sudden onset of epigastric pains, increased amount of nausea and vomiting, localization of pain over McBurney's point.

Examination.—Localized pain over McBurney's point.

Laboratory.—White blood cells 11,700, polymorphonuclear leucocytes 78 per cent.

Sent home after three days.

CASE 3.—M 2369, white, 19 years old, primipara, 2 months' gestation.

History.—Generalized abdominal pains of two days' duration associated with nausea, localization of pain in lower right quadrant.

Examination.—Slight pain on palpation over McBurney's point.

Laboratory.—White blood cells 9,450 polymorphonuclear leucocytes 56 per cent.

Discharged.

CASE 4.—M 9809, white, 20 years old, primipara, 4 months' gestation.

History.—Pain over the right lower quadrant associated with vomiting of 4 days' duration, localization of pain over McBurney's point, which was relieved by application of ice to abdomen and aggravated by motion.

Examination.—Pain localized over McBurney's point.

Laboratory.—White blood cells 13,200; polymorphonuclear leucocytes 74 per cent.

No operation.

CASE 5.—106435, white, 24 years old, primipara, at term.

History.—Generalized abdominal cramps (interpreted as pseudo-labor) associated with vomiting, localization of pain in right lower quadrant.

Consultation.—"Suggestive of acute appendicitis or twisted omentum, watch blood counts."

Laboratory.—Counts taken every six hours:

White blood cells	Polymorphonuclears
25,400	89%
17,500	79%
19,600	83%
18,400	86%
16,900	89%
18,300	88%
13,100	83%

Attack subsided; discharged.

CASE 6.—L 10198, Negro, 24 years old, para ?, 6 months' gestation.

History.—"Sore throat" and generalized abdominal pain for one week; marked pain in right lower quadrant associated with polyuria, dysuria, diarrhea of two days' duration.

Examination.—Generally toxic; severe pain in right lower quadrant.

Laboratory.—Hemoglobin 12 Gm.; red blood cells, 3,640,000; white blood cells 31,700; polymorphonuclear leucocytes 93 per cent with "toxic granulation."

Operation.—Spinal anesthesia; drainage of abscess through McBurney incision.

Expired on operating table.

CASE 7.—B 35600, white, 29 years old, para i.

History.—Epigastric pains; localization in right lower quadrant associated with vomiting, two days' duration.

Examination.—Tenderness right lower quadrant and right upper quadrant.

Laboratory.—White blood cells 11,650; polymorphonuulear leucocytes 90 per cent.

Operation.—McBurney incision; gangrenous appendix removed; abdominal drains inserted; culture negative for growth; died fifth postoperative day.

Autopsy.—Septic emboli in the mesentery; gangrenous bowel.

CASE 8.—58141, white, para i, at term.

History.—Previous admission 6 days previously, discharged after unsuccessful attempt at induction of labor (quinine, oleum ricini, Pitressin). December 1, onset of generally severe and colicky abdominal pains, followed by nausea and vomiting; localization of pain in right lower quadrant.

Laboratory.—White blood cells, 12,000, polymorphonuclear leucocytes 96 per cent; nonfilamented 8 per cent.

December 2, consultant believed condition due to toxemia of pregnancy. December 3, baby delivered stillborn after medical induction. Temperature normal. Nausea, moderate distention. White blood cells 28,000; polymorphonuclear leucocytes 95 per cent; nonfilamented 7 per cent. December 4, marked distention; temperature 100.6° F., diagnosis of acute appendicitis made and medical treatment advised.

Died on tenth day.

CASE 9.—10859, white, 20 years old, primipara, at term, admitted April 24, 1947.

History.—Admitted to hospital with complaint of increasingly severe right costovertebral pain which radiated to right flank.

Examination.—Pain over right costovertebral angle, temperature 99° F.

Laboratory.—Red blood cells 3,160,000; white blood cells 29,800; polymorphonuclear leucocytes 84 per cent; stabs 31 per cent; urinalysis, negative; penicillin given in adequate dosage. April 26, 1947, pain in right costovertebral angle became more severe and radiated to the right flank and the right lower quadrant; vomiting occurred and shortly afterward there was localization of pain in the right lower quadrant.

Examination.—Marked costovertebral pain, slight tenderness in the right flank but no abdominal pain. Catheterized urine specimen revealed an occasional pus cell.

Diagnosis.—Acute pyelonephritis of right kidney concurred in by consultant.

April 27, 1947, severe dyspnea developed; the pain in right costovertebral angle was more severe, a cough developed.

Examination.—Marked abdominal distention, no peristalsis to auscultation. Chest x-ray revealed acute pneumonic process at both bases. The diagnosis became obvious, and conservative treatment was advised, which was carried on energetically.

The patient succumbed on the eighth day. Post-mortem revealed gangrenous appendicitis, generalized peritonitis, pyelonephritis, bilateral lobar pneumonia of lower lobes.

Summary and Conclusion

The anamnesis of acute appendicitis in the pregnant woman was the same as that in any other individual and it was the most reliable feature in the diagnosis.

Physical examination was misleading because the usual findings in over one-half the cases were either poorly demonstrable or absent altogether.

The simple blood pictures were poor diagnostic aids. Many of the acute cases had counts within the upper limits of normal while many of the nonacute cases had counts usually associated with advanced suppurative appendicitis or peritonitis.

The deaths were found in the well-advanced cases of appendicitis and peritonitis.

The most important factor to be considered in the differential diagnosis was the pain associated with the enlarging uterus in the early stage of pregnancy and the "lightening" pains of the mother at term.

If there is a definite anamnesis of appendicitis accompanied by poor or absent physical signs and an inconclusive blood picture, this report strongly suggests that immediate operation is indicated.

CARCINOMA OF THE VULVA

A Review of Fifty Cases

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DURING the ten-year period from January, 1937, through December, 1946, there were 50 cases of proved carcinoma of the vulva admitted to Charity Hospital at New Orleans. This represents 2.4 per cent of all malignancies of the female genital tract (2,058), and 0.11 per cent of all gynecologic admissions (44,770) during this period. Included in this series are all histologically confirmed malignant lesions arising in the labia, clitoris, Bartholin's glands, and vestibule. Also included is one case of periurethral carcinoma.

The youngest patient in the group was 23 years of age and the oldest 80, the average age being 53.4 years. This is somewhat less than the average age of 58 to 60 reported by Taussig,[30] Graves and Mezer,[7] and Folsome.[6] Twenty-one cases (42 per cent) occurred in patients under the age of 50, but the greatest actual number (10) occurred in the eighth decade (Table I). Sixty-six per cent of the patients had reached or passed the menopause before presenting themselves for diagnosis. Twelve women were nulliparous while 38 had borne one or more children.

Shannon and Marting,[23] in reviewing the literature, cited five cases of carcinoma of the external genitals complicating pregnancy and added a report of a sixth case. Four of these presented carcinoma of the vagina, and two carcinoma of the vulva. Included in this series are two patients, both Negro, in whom the lesions of the vulva were first discovered during pregnancy. One of these patients, aged 29 years, is alive four years following partial vulvectomy and has had one subsequent pregnancy. The other patient, aged 27 years, is alive and apparently well eighteen months after a vulvectomy and bilateral lymph node resection, performed one month following the vaginal delivery of a living child. Thirty-one cases (62 per cent occurred in Negro women, a total of 0.13 per cent of 24,481 Negro gynecologic admissions during this period. In white patients the incidence was 0.09 per cent of 20,289 admissions. Thus, this series shows no great difference in the incidence of vulvar carcinoma in Negro and white women in the New Orleans area.

TABLE I. AGE INCIDENCE

AGE (YEARS)	NO. OF CASES
20-29	4
30-39	9
40-49	8
50-59	8
60-69	9
70-79	10
80-89	2

It is discouraging to note the time elapsed from the onset of symptoms to the time the patients first sought admission to the hospital (Table II). The shortest period of time elapsed was two weeks, the longest ten years.

In the majority of cases, the presenting symptom was the presence of a "sore" (growth, ulcer) on the external genitals followed in order of frequency by itching, burning, pain, and bleeding. Nine of the patients (18 per cent) had a pre-existing leucoplakia. Other pre-existing lesions included papillomas (type undetermined), in four cases, and venereal warts in one case (Table III). There was a history of mechanical trauma in two cases. Eighteen (36 per cent of the patients had one or more of the specific venereal infections (Table IV). Syphilis occurred alone eight times, granuloma venereum twice, and chancroid once. Syphilis and lymphogranuloma inguinale occurred together in four cases. There was one case each of the following combined infections: Syphilis and granuloma venereum; syphilis, lymphogranuloma inguinale, and chancroid; chancroid and granuloma venereum. As far as could be determined from the hospital records, none of the white patients in this series had venereal disease.

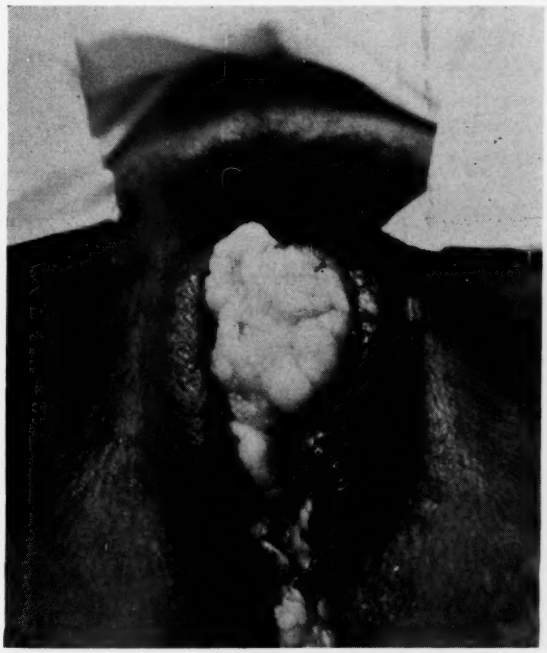

Fig. 1.—Fungating carcinoma of the vulva in a 27-year-old pregnant Negro woman. Patient was delivered of a living child and one month later a vulvectomy and bilateral lymph node resection were performed. Living and apparently well one and one-half years later.

TABLE II. DELAY IN SEEKING HOSPITAL TREATMENT

DURATION OF SYMPTOMS	NO. OF CASES
Less than 1 month	1
1 to 3 months	9
3 to 6 months	6
6 to 9 months	7
9 to 12 months	1
1 to 2 years	7
2 to 3 years	6
3 to 4 years	3
4 to 5 years	1
Over 5 years	6
Insufficient data	3

TABLE III. POSSIBLE PREDISPOSING FACTORS

Granulomatous venereal lesions	18
Leucoplakia	9
Papillomatous lesions	4
Trauma	2
Venereal warts	1

TABLE IV. ASSOCIATED VENEREAL INFECTIONS

Syphilis	8
Syphilis and lymphogranuloma inguinale	4
Syphilis, granuloma venereum	1
Syphilis, lymphogranuloma inguinale, chancroid	1
Chancroid and granuloma venereum	1
Chancroid	1
Granuloma venereum	2

All but one of the 21 patients under the age of 50 years were Negro. It is probably significant that 12 (60 per cent) of these Negro patients had one or more of the granulomatous venereal diseases. This evidence suggests that the presence of granulomatous venereal lesions may favor the early appearance of carcinoma of the vulva.

The primary site of the lesion, so far as could be determined was on the labia in 37 cases, in the vestibule in three cases, and in Bartholin's glands in four. In five cases, the initial lesion was on the clitoris. There was an equal distribution between the right and left sides. No attempt was made to separate lesions of the labia into those arising on the labia majora or the labia minora.

Rarely does metastasis to the vulva occur from carcinomas primary elsewhere in the body.[6] Only one such case was discovered among the 44,770 gynecologic admissions covered in this survey, the patient being a 63-year-old Negro woman who had an adenocarcinoma of the vulva, metastatic from the rectum. This case is not included in the series. Included is one case of malignant melanoma arising in the right labium majus, one case of mixed adenocarcinoma and epidermoid carcinoma apparently arising in the left Bartholin's gland, and one case of extensive Bowen's disease associated with grade III epidermoid carcinoma. One lesion was periurethral in origin and was epidermoid in character. There were three other examples of adenocarcinoma arising in the Bartholin's glands. The remaining 43 lesions were epidermoid carcinomas. Histologic sections were still available for study in 43 of the 50 cases. The seven cases in which the slides were no longer available had been histologically diagnosed by competent pathologists. The 37 cases of epidermoid carcinoma in which slides were available were reviewed and graded. Twenty-three were grade II, 11 were grade III, one was grade IV. Two were unsuitable for grading.

In three patients there was more than one malignancy. All of these patients were white. One woman had a vulvectomy in 1941, at the age of 67 years, for epidermoid carcinoma. She was readmitted in 1944 with a carcinoma of the stomach. At that time the genital lesion was apparently cured. The patient refused surgery and cannot now be traced. The second patient was treated in 1938 at the age of 72 years for epidermoid carcinoma of the hand and nose. In 1940, a malignant melanoma of the vulva appeared and was treated radiologically on the basis of a mistaken diagnosis of epidermoid carcinoma. In 1944, adenocarcinoma of the fundus of the uterus was diag-

nosed and treated radiologically. This patient was still alive in December of 1946. The third patient, aged 55 years, is perhaps the most interesting. In 1930, a radical mastectomy was done for adenocarcinoma of the left breast. In 1934, a papillary adenocarcinoma of the right ovary was removed. Carcinoma appeared in the right breast in 1936 and a second radical mastectomy was performed. Epidermoid carcinoma of the left labium developed in 1940. The patient died two years later. An autopsy was not performed. In none of these cases was there any obvious relationship between the vulvar lesion and the malignancy elsewhere. Although the number of cases is not sufficient for statistical treatment, the presence of three patients with multiple carcinoma in a group of 50 is of interest.

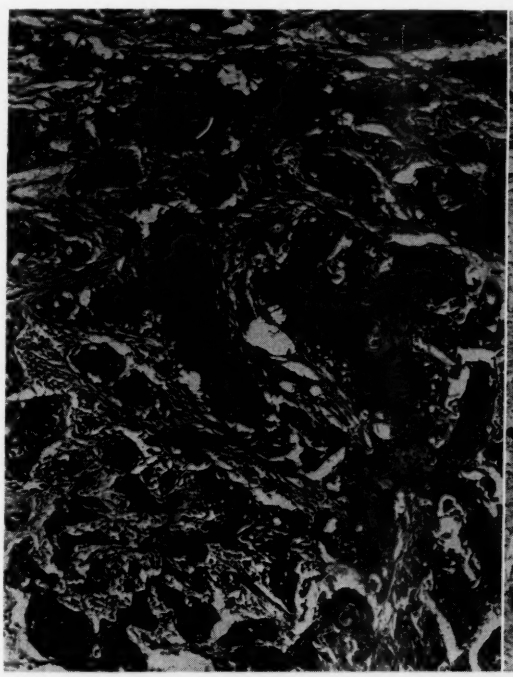

Fig. 2.

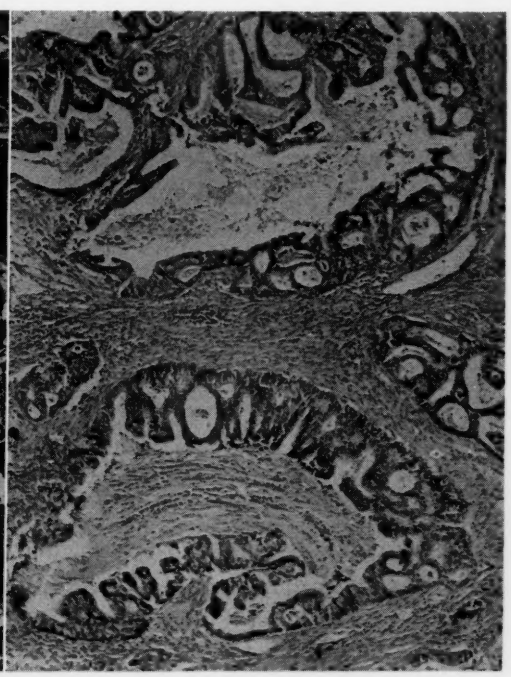

Fig. 3.

Fig. 2.—Photomicrograph of epidermoid carcinoma of the vulva showing "pearl" formation.
Fig. 3.—Photomicrograph of adenocarcinoma of the vulva arising from Bartholin's gland.

Autopsies were performed on two patients in this series and in neither was any distant metastasis evident. Eichenberg[5] autopsied 41 cases of carcinoma of the vulva and found extension as far as the peri-aortic lymph nodes in only five. Distant metastasis, when present, usually occurs late in the course of the disease. The usual spread, even from a unilateral primary lesion, is to the lymph nodes in the groin on one or both sides. Later on, invasion of the deep femoral and obturator nodes may occur. Vulvectomy and resection of the superficial and deep lymph nodes on both sides are therefore indicated.

Thirty-three of the 50 cases comprising this series were treated surgically. Table V outlines the methods of treatment used on all patients in the series. Lymph node metastases were found in four of the thirteen cases in which

lymph node resection was performed, an incidence of 30 per cent. To allow for the conventional five-year follow-up period, those patients treated before January, 1942, will be considered in greater detail (Table VI).

TABLE V. THERAPY, ALL PATIENTS

Vulvectomy with bilateral lymph node resection	10
Vulvectomy with unilateral lymph node resection	1
Hemivulvectomy with bilateral lymph node resection	1
Hemivulvectomy with unilateral lymph node resection	1
Vulvectomy	13
Partial vulvectomy	4
Cautery or excision	3
Irradiation	11
No therapy	6
	50

TABLE VI. THERAPY, 22 PATIENTS TREATED PRIOR TO JANUARY, 1942

MODE OF TREATMENT	NUMBER OF PATIENTS	ALIVE 5 YEARS
Vulvectomy with bilateral lymph node resection	2	2
Vulvectomy	4	1
Partial vulvectomy with unilateral lymph node resection	2	0
Partial vulvectomy	2	0
Excision or cautery	2	0
Irradiation	5	1
No therapy	5	1
	22	5

Twenty-two cases were followed for over five years. Of these, the disease was too far advanced in five to permit any treatment, five received irradiation alone, and twelve were treated surgically. Only two of the twelve patients treated surgically received the complete vulvectomy and bilateral lymph node resection. Both are alive and well after five years. There was microscopic evidence of lymph node metastasis in one of these cases. Two other patients are alive and well after five years. One was treated by simple vulvectomy and the other by irradiation. The latter patient had a malignant melanoma, mistakenly diagnosed as epidermoid carcinoma. Melanoma of the vulva is a rare lesion not ordinarily responsive to radiation but this patient appears to represent an exception to the rule.

A fifth patient had no treatment because of advanced age and general debility, yet she did not die until five years after the diagnosis of carcinoma of the vulva had been made. There was one operative death following vulvectomy. Eight other patients could not be traced and for statistical purposes are considered as dead. Thus the five-year known survival rate is 22.7 per cent and the five-year known cure rate is 18.1 per cent.

The results of irradiation therapy have been unsatisfactory. Healy[11] notes that carcinoma of the vulva is seldom seen except in women with some pre-existing vulvar lesion or abnormality. He further states that not even a normal vulva will tolerate the dosage of radiation necessary to destroy a large carcinoma. Extensive ulceration and slough often results from heavy irradiation. Plate,[20] at the University of Amsterdam, treated 14 malignancies of the vulva radiologically with no five-year survivals. The patient in this series who were treated by radiation alone were considered inoperable and the treatment was palliative.

Summary and Conclusions

Carcinoma of the vulva occurs most often in elderly women but may also be seen in younger age groups. Forty-two per cent of the 50 cases in this series occurred in patients under the age of 50, the average age being 53 years. In 2 patients, the disease of the vulva was complicated by pregnancy. In the New Orleans area the disease is as common in colored women as it is in white women. Fifty-eight per cent of the colored women had granulomatous venereal lesions of the vulva. All lesions of the vulva that fail to respond to treatment in a reasonable time should be biopsied, and it is to be emphasized that one negative biopsy does not rule out malignancy. Treatment is surgical and should consist of complete vulvectomy with bilateral lymph node resection. Radiation has some value in palliation but will seldom effect a cure. In a group of twenty-two patients treated prior to 1942 by a variety of methods, four (18.1 per cent were living without evidence of disease five years later.

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AN EVALUATION OF THE GUTERMAN PREGNANCY TEST*

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BETWEEN the years 1903 and 1934 various investigators postulated the corpus luteum to be a gland of internal secretion; carried out experiments to prove this; isolated its hormone (progesterone) and determined its structural formula. In 1929, Marrian[11] isolated pregnandiol from the urine of the pregnant woman.

In 1936 Odell and Marrian[2] showed that most of the pregnandiol recovered from urine exists in a combined form, from which it can be freed by acid hydrolysis. Venning and Browne[3] extracted sodium pregnandiol glucuronidate from urine. A quantitative method of assaying urine for sodium pregnandiol glucuronidate was presented by Venning in 1937.[4] Since 1937 considerable work has been done to prove that pregnandiol, as sodium pregnandiol glucuronidate, represents the excretory product of progesterone metabolism. Weil[5] demonstrated that hydrolysis of some of the combined form of pregnandiol to the free form occurs spontaneously. He devised a method[6] for recovering free pregnandiol from urine. Since then, several methods[7-11] have been advanced for assaying urine for both the free and combined forms, either independently or simultaneously.

In 1944 Guterman[12] presented a modification of earlier techniques, particularly that of Astwood and Jones.[7] He demonstrated the value of pregnandiol determinations in the diagnosis of early pregnancy.[12, 13] This postulation had been suggested previously by others. The rapidity and inexpensiveness of Guterman's method made it a practical procedure. An accuracy of 92 per cent was reported by Guterman with this method. The presence of 0.4 mg. or more of pregnandiol in 100 c.c. of a first voided morning urine specimen in a woman who has missed an expected menses indicates a normal pregnancy. Attempts to corroborate Guterman's findings have resulted in conflicting reports.[14-16] Critical analysis indicates that the workers who found the method invalid, in some instances at least, failed to adhere strictly to the technique as originally described by Guterman.

This paper represents an evaluation of the Guterman pregnancy test (as based on a color reaction of pregnandiol in the urine) in eighty-six consecutive patients with missed menses in whom there were no symptoms of threatened miscarriage.

Method

For emphasis, the method will be described in detail, including its adaptation to a quantitative technique, using the Klett-Summerson photoelectric colorimeter.[17] Only one departure from the procedure as outlined by Guterman was made. Twelve-hour summaries, rather than the first voided morning specimen, were used.

Collection.—Patients were asked to collect urine specimens as follows: The patient voided at some convenient time, e.g., 8 P.M., and discarded the

*Aided by a grant from the Noshim Rachmomioth Society of St. Louis.

specimen. From then on all urine voided was saved and collected in a single jar. Twelve hours later (8 A.M.) the patient again voided and added the specimen to the total. The entire volume was then brought to the laboratory, usually that same morning. No preservative or refrigeration was used. The patients were instructed to keep the urine in a cool place during the period of collection. This overnight collection period was selected because it resulted in remarkably little inconvenience to the patient.

Technique.—Determinations were made on the same day, or the following morning, that the specimens were received. The entire volume was measured. The pregnandiol content of a 100 c.c. aliquot was determined. From this determination, the amount of pregnandiol excreted per twelve hours was calculated.

A. Hydrolysis and Extraction of Pregnandiol:

1. One hundred ml. urine, 50 ml. toluene, 10 ml. concentrated hydrochloric acid, and 2 glass beads are added to a 500 ml. flat-bottomed Florence flask.

2. The flask is connected via a one-holed cork stopper to a Liebig condenser (water-cooled, 400 to 500 mm. jacket length) in vertical position and the mixture is boiled vigorously over an electric hot plate for 15 minutes.

3. The flask and its contents are brought to room temperature by cooling under the water tap.

4. The mixture is transferred to a 500 ml. separatory funnel and the lower layer (urine) is drawn off.

5. The toluene layer and emulsion are washed twice with 15 ml. portions of 0.1N sodium hydroxide and then twice with 15 ml. portions of distilled water.

B. Precipitation of Impurities:

1. The washed toluene and emulsion (A-5) are transferred to a 125 ml. Erlenmeyer flask with 2 glass beads.

2. The mixture is boiled over an electric hot plate (in the hood).

3. When the water has evaporated and the toluene mixture is boiling smoothly, 10 ml. of 2 per cent sodium hydroxide in absolute methanol are added.

4. The mixture is evaporated until a granular precipitate appears and approximately one-half of the original toluene volume is reached.

5. The toluene mixture is then filtered, while hot, through a fritted glass filter (medium porosity, Pyrex) with mild suction. (If the filtrate has an orange, pink, or brown tinge, steps B-3, B-4, B-5 must be repeated until the filtrate is yellow or yellow-green.)

6. The precipitate (B-5) is washed with 15 ml. hot toluene.

7. The combined filtrates (B-5 and B-6) are then evaporated to dryness over the hot plate (in the hood), a gentle air stream being used to drive off the last traces of toluene. This avoids charring of the residue.

C. Precipitation of Pregnandiol:

1. Five ml. acetone are added to the residue (B-7) and the mixture is warmed over a hot plate until solution is complete.

2. Twenty ml. 0.1N sodium hydroxide are added slowly and the mixture is boiled for 3 minutes on the hot plate.

3. The flask is then placed in a refrigerator (5° C.) for one hour.

D. Isolation of Pregnandiol:

1. The mixture (C-3) is filtered through a fritted glass filter (medium porosity, Pyrex) with mild suction.

2. The precipitate (D-1) is washed with 15 ml. distilled water.

3. The receiving flask is changed and 10 ml. hot absolute alcohol are passed through the fritted glass filter to dissolve the precipitate.

4. The alcohol filtrate (D-3) is evaporated to dryness from the receiving flask over an electric hot plate (in the hood).

E. Color Development and Quantitative Measurement:

1. 10 ml. concentrated sulfuric acid are added to the residue (D-4).
2. Color is allowed to develop for one hour.
3. Aliquots of the solution E-2 are diluted up to a final volume of 5 ml. with concentrated sulfuric acid in a dry Klett curvette tube and the solution thoroughly mixed.
4. The color is read on a Klett-Summerson photoelectric colorimeter, using the blue No. 42 filter.
5. The amount of pregnandiol represented by the absorption reading is obtained from the standardization curve.* Calculations for the dilutions involved are made to ascertain the pregnandiol present in the original sample.

Results

Pregnandiol values of 3 mg. or more for the total twelve-hour summary were considered positive for pregnancy. The following follow-up studies were done to determine the validity of the results. A negative result was considered correct if a normal menses ensued or if passage of time failed to reveal an enlarging uterus. A positive result was considered correct if the passage of time revealed a continuing pregnancy or if an abortion followed at some subsequent period.

Correct correlation between the laboratory procedure and clinical findings was obtained in 96.5 per cent of all cases.

The results are summarized in Tables I and II.

TABLE I

ANSWER	CORRECT	FALSE	PER CENT CORRECT
Positive	58	3	95
Negative	25	0	100
Total	83	3	96.5

TABLE II

CLINICAL STATE	CORRECT	FALSE	PER CENT CORRECT
Pregnancy	58	0	100
Delayed menses	25	3	89.3

Discussion

The use of twelve-hour summaries rather than single voided specimens was instituted due to our inability to obtain consistent results with the latter during our preliminary work with the method. Guterman considers a deep yellow color reaction as his minimum positive, assuming that such a color (equivalent to 0.4 mg. per 100 c.c.) indicates a 24-hour excretion of pregnandiol of 6 to 8 mg. In our experience, such an assumption led to a large number of errors. Studies of others[18] and in our own laboratory indicate that pregnandiol excretion is relatively constant per given period of time and is relatively independent of urinary volume. Calculations of 24-hour output based on the pregnandiol content of a 100 c.c. sample of urine representing

*Standardization curve prepared from pregnandiol supplied by Ayerst, McKenna and Harrison, Ltd.

the urinary excretion of an undetermined length of time are therefore often erroneous. The 12-hour summary was used because it inconvenienced the patient only slightly and for practical purposes is as reliable as longer summations.

Cases studied represented individuals who had missed an expected menses and in whom a diagnosis of pregnancy had not been established. This group of patients consisted of private and clinic patients between the ages of 17 and 48 years, primiparas and multiparas. The period of delayed menses varied from one day to 84 days, one-third of the cases being less than fourteen days delayed. Both house and outpatients were included.

In three instances, patients who were being studied as sterility problems revealed pregnandiol curves indicative of pregnancy even before the patient had reported the missed period. This is consistent with the physiology of corpus luteum formation and retrogression and its measurable component, pregnandiol determination.

It is to be noted that the false results in this series were all false positives. Readings higher than are reported in the literature were occasionally obtained. This would indicate that the final product isolated by the procedure may, at times, contain chromogenic material other than pregnandiol. We feel that it may be possible to reduce the amount of such chromogenic contaminant without complicating the procedure or losing significant amounts of pregnandiol.

Summary and Conclusions

1. The Guterman pregnandiol test for pregnancy, modified only in that twelve-hour summaries were employed rather than single voided specimens, was performed in 86 consecutive cases of suspected pregnancy uncomplicated by any symptoms of threatened abortion.

2. An over-all correct percentage of 96.5 per cent was obtained.

3. Guterman's claim that the method represents an accurate and rapid test for the diagnosis of early pregnancy is corroborated.

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DETECTION OF EARLY CARCINOMA OF THE CERVIX; THE CONING BIOPSY

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A SIGNIFICANT advance in the problem of uterine cancer has been made in the past decade by investigators who have demonstrated the importance of constant, even fanatical devotion to the clinical and pathological search for early lesions. This concept has altered our approach to these diseases vastly, so that we can properly hope that future therapeutic advances will rest on a firmly established pattern of early diagnosis. The attainment of this objective of early diagnosis could almost content us with our present methods of treatment, for they might suffice to eliminate death from uterine cancer.

Every cervical lesion which raises any suspicion of neoplasm should be biopsied. It has been clearly demonstrated in several gynecological clinics (TeLinde,[1] Johns Hopkins; Younge,[2] Free Hospital for Women, Brookline) that one can constantly increase the number of early and preclinical lesions discovered, by enthusiasm for biopsy. It has also been observed by several investigators (Pund et al.[3] and others) that routine serial or multiple sectioning of apparently normal cervices removed at hysterectomy for benign uterine lesions will uncover a striking percentage of nonclinical intraepithelial cancers. One can only utilize these facts by more widespread employment of biopsy.

Various punch biopsy instruments are available for obtaining fragments of cervical tissue. These are most successfully used on the friable well-defined cervical lesion. One should take multiple biopsies whenever possible on any suspicious lesion and also on clinically benign erosions which require treatment.

Coning biopsy of the entire squamous-columnar junction must be done at present with the scalpel; this properly requires brief hospitalization for anesthesia but it is rewarded by more accurate information than that obtained by single biopsy; it enables the pathologist to make a complete survey of early lesions and thus furnishes the clinician with the precise data required for proper treatment. This method has become increasingly important as more intraepithelial cancers are detected on single biopsy and one must ascertain whether this represents the intraepithelial edge of an invasive tumor, or an actual preinvasive neoplastic change.

The successful use of the vaginal smear in the detection of early cervical cancer has also forced a revision in our thinking about cervical biopsy for we are frequently presented with a suspicious or frankly positive smear from a

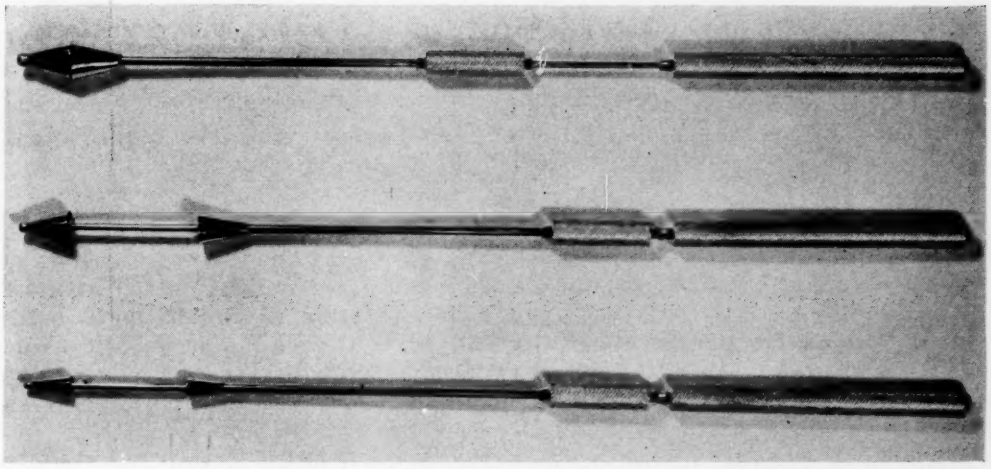

Fig. 1.—Endocervical coning biopsy curettes. The smaller ones are in "open" position, the largest is closed.

Fig. 2.—Section of endocervical coning biopsy showing a representative sampling of the squamous-columnar junction region. (×70)

patient whose cervix is a clinically normal one or one which harbors a symmetrical, innocent-appearing erosion. Coning biopsy is the only logical technique for securing adequate tissue for study in such cases.

The increasing need for such a biopsy technique which could be performed simply, as an outpatient method without anesthesia has encouraged our search for an instrument to perform this job. Failing to find one, we have designed an endocervical coning biopsy curette* which has satisfied our requirements in preliminary trials.

Fig. 1 illustrates several such coning biopsy curettes of graduated sizes. A width should be chosen to fit quite snugly into the canal for several centimeters. We prefer to steady the cervix with a tenaculum on the anterior lip. With the curette in "open" position, a twisting motion of slight withdrawal will enable the distal cutting cup edge to gain a purchase into the tissue. The proximal cutting cup may then be brought forward to meet the distal one by a fairly rapid, slightly rotating motion which will remove a superficial cone of tissue from the squamous-columnar junction. If the instrument does not fit the canal well, it may be necessary to angulate it slightly in several directions and close the biopsy cups in each position before a complete cone of tissue will be removed. This shift of position may also be valuable in cases of cervical erosion where the squamous-columnar junction is outside the external os.

Fig. 2 is a routine section of a coning biopsy obtained with this curette. It is a surface biopsy of the external os area which has been surgically "conized" in the above-described manner.

Figs. 3 and 4 illustrate further the focal ability of this type of biopsy. This tissue was obtained from the squamous-columnar junction of a patient admitted to the hospital because of intermenstrual spotting. Pelvic examination revealed no area on the cervix suspicious of cancer. A vaginal smear and endocervical coning biopsy were taken on the ward before operation. The following day a dilatation and curettage, and a scalpel biopsy of the cervix were performed under anesthesia. The tissue removed by these conventional techniques was negative; it contained no suggestion of malignancy. However, the vaginal smear was positive, and the coning biopsy confirmed this preliminary detection for it presented incontrovertible evidence of intraepithelial carcinoma of the cervix. The advantage of such a technique which could obtain a sample of tissue from this crucial region of the cervix was clearly demonstrated.

The limitations of such an instrument are evident. One should utilize curettage and scalpel biopsy under anesthesia whenever necessary to supplement the documentation of cases whose diagnosis is not clear. However, this endocervical biopsy curette may be generally used in the clinic or office to secure tissue from the suspicious area of any cervix in simple fashion. It can serve as a useful corollary to the vaginal smear technique in early detection and it could make such detection studies available to pathological laboratories that are not set up for cytological diagnosis.

This renewed emphasis on the detection of early carcinoma of the cervix also demands a fresh approach to classification and treatment. A precise clinical classification of these lesions should help clarify decisions concerning

*This work has been carried forward with the generous cooperation of the Sklar Surgical Instrument Company.

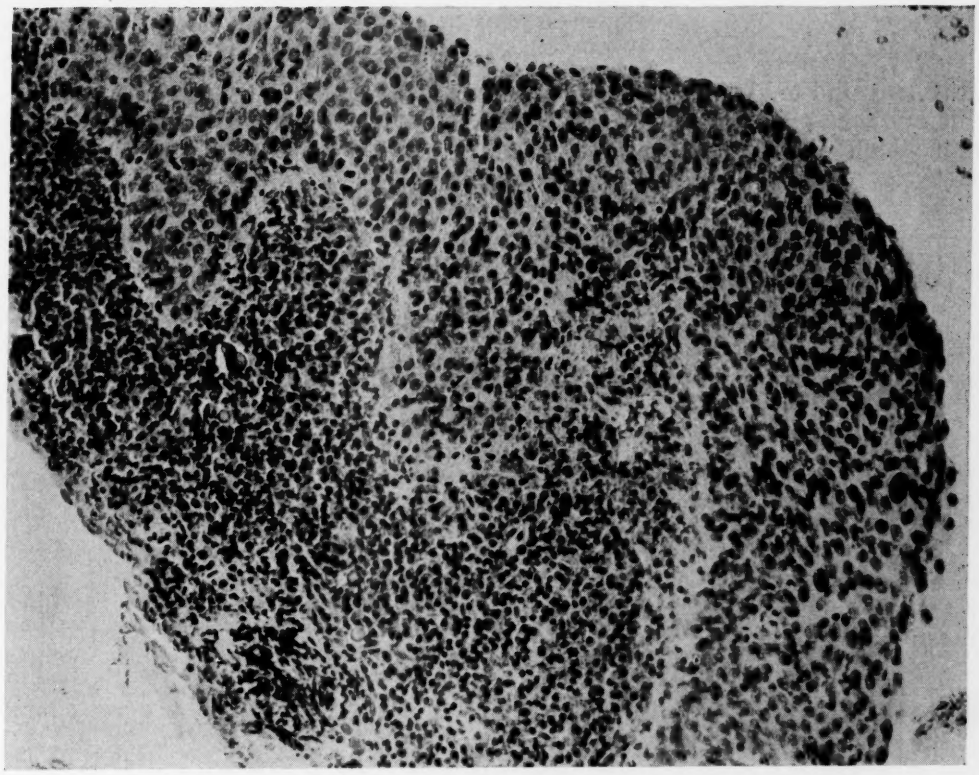

Fig. 3.—Section of endocervical biopsy showing strip of intraepithelial carcinoma. Marked inflammatory reaction is present in stroma. (×150)

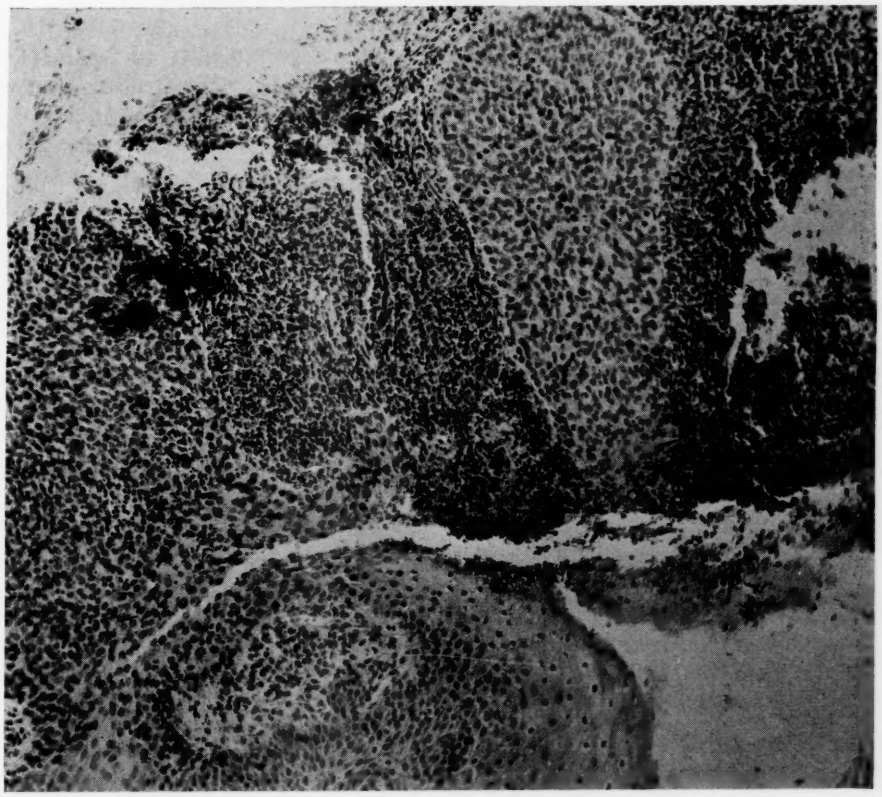

Fig. 4.—Section of endocervical biopsy showing junction of normal and neoplastic tissue. Marked inflammatory reaction is present in stroma. (×125)

treatment and enable investigators to codify their contributions to this important subject with greater benefit to the advancement of our knowledge. A plan which we have used at the Sloane Hospital is herewith presented:

Carcinoma of Cervix

League of Nations Clinical Classification
Used at the Sloane Hospital for Women[*6]

Stage 0	Intraepithelial carcinoma
Stage I	Lesion confined to cervix
	(A) Cytological (nonclinical lesion, early invasive)
	(B) Small clinical lesion (under 1 cm.)
	(C) Large clinical lesion (over 1 cm.)
Stage II	Usual league of Nations designation
Stage III	Usual league of Nations designation
Stage IV	Usual league of Nations designation

Summary and Conclusions

1. The importance of early detection of cervical carcinoma by frequent biopsy is re-emphasized.

2. A new instrument for obtaining an adequate biopsy in simple fashion is described. This endocervical biopsy curette will secure a general sample of the squamous-columnar junction area.

3. A subdivision of the League of Nations Classification of carcinoma of the cervix which has been found useful in our clinic is presented.

Addendum

Since the preparation of this presentation, another paper (Ayre[5]) has appeared which emphasizes the importance of the coning biopsy and describes a scalpel method of obtaining it.

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*In the Tumor Clinic under the direction of Dr. J. A. Corscaden.

PROLAPSUS UTERI IN NULLIPARA*

With Reference to the Etiological Role of Occult Spina Bifida

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THE etiological factors in prolapse of the uterus usually have their origin in the stresses incident to childbearing. However, in 963 cases of prolapse of the uterus seen in the Elizabeth Steel Magee Hospital and the St. Francis Hospital in Pittsburgh, Pa., from January, 1934, to April, 1947, there have been 19 cases in nulliparous patients, an incidence of 1.97 per cent.

Predisposing factors in prolapse of the uterus in nulliparas are varied. The uterus is often either congenitally retroflexed or retroverted, and the uterine position is thus in the axis of the vagina and prolapse may ensue either by subsequent trauma as a factor, poor nutrition, intra-abdominal pressure, and/or faulty innervation. Petchenko[5] reported that nutrition seems to be a factor as the incidence of genital prolapses increased sharply during the German blockade of Leningrad. Secondly, there is also an element of infantilism in many cases of procidentia in nulliparous women. The fact that they are sterile is highly suggestive.

Occult Spina Bifida

Findley[3] in 1917 reported two cases of prolapse in nulliparous women, and called attention to the probable relationship of occult spina bifida to this condition. He emphasizes that the pelvic supporting structures, pelvic floor and muscles were relaxed and atrophied.

Spina bifida occulta is defined as a malformation in the laminae of one or more vertebrae, without protrusion of spinal membranes. Willis,[10] after a study of a series of 1,400 skeletons, concluded that anomalies of the spine are confined particularly to the lumbosacral area of the column, and occur as the result of evolutionary, developmental, or environmental influences.

It has been demonstrated at operation or autopsy that together with the bony malformation present, there are, in practically all cases, bands of fibrous tissue extending between the ventral surfaces of the laminae and the dura or the nerve roots, and masses of fat tissue in contact with the nerve roots. The pudendal nerve is the principal nerve for the supply of the perineum. It arises in the pelvis usually by three roots from the second, third, and fourth sacral segments.

The spine grows faster than the cauda equina, and symptoms due to the stretching of the roots may not appear until adolescent or adult life. Trauma may aggravate latent symptoms.

Signs and symptoms of spina bifida occulta may be hypertrichosis, estimated in 4 per cent of the cases, striae, scars, fovea sacralis, and naevi. The local signs are usually absent, and may occur even without occult spina bifida. A subcutaneous lipoma or hemangioma may be present.

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*Presented, by invitation, at a meeting of the Pittsburgh Obstetrical and Gynecological Society, Feb. 2, 1948.

Associated with spina bifida and prolapsus uteri in the newborn are numerous congenital defects such as hydrocephalus, scoliosis, kyphosis, clubfoot, infantile uterus, flat and shallow vagina, elongated cervix, and paresis of the perineal muscles, and disturbed sensation in the lower extremities. Neurologic symptoms may be sensory, motor, and trophic disturbances. In a person with clubfoot it is estimated that spina bifida occulta is present in 60 per cent of cases.

Visceral symptoms may be anorectal signs—relaxed sphincter ani, paralysis of the levator ani muscles, rectal and urinary incontinence. Eneuresis is regarded as a prominent symptom.

The diagnosis of occult spina bifida is made definite by x-ray examination. According to the literature there is a wide variation in the incidence of occult spina bifida. Laws[4] estimates that 4 per cent of all women have occult spina bifida. Ebeler found in 28 cases without prolapse there were only three in which spina bifida occulta did exist. In 28 cases with prolapse, 25 of the 28 showed spina bifida occulta.

Since 1938 one member of our staff has been interested in this observation, and has had x-ray examinations made of the lumbosacral region in his nulliparous patients with prolapse—a total of six cases. Two of these cases, or 33.3 per cent, had occult spina bifida. Two cases showed lumbar scoliosis with convexity to the left and no evidence of occult spina bifida. One case was normal, and the sixth case showed hypertrophic arthritic changes involving the lumbar spine and the right lumbosacral junction. Three additional cases have subsequently been x-rayed and were negative for presence of spina bifida occulta. The total incidence of this series thus is 22.2 per cent.

The above two cases with occult spina bifida present on x-ray study are reported in more detail.

CASE 1.—Aged 58 years, single, was admitted to the hospital on May 1, 1938, with the complaint of burning and frequency of urination, generalized abdominal pain, and a mass protruding from the vagina of one month duration. Physical examination showed the presence of a third degree prolapse of the uterus, relaxed perineum, and generalized abdominal tenderness. There were no cystocele or rectocele present. An x-ray of the lumbosacral region showed the presence of spina bifida occulta of the first, fourth, and fifth sacral segments with hypertrophic arthritis involving the articular facets of the lumbosacral region. Treatment of the prolapse was surgical. A vaginal hysterectomy and modified colpectomy and perineorrhaphy were performed. The patient was discharged on June 2, 1938, in good condition.

CASE 2.—Aged 50 years, single, was admitted to the hospital on Jan. 2, 1944, with the chief complaint of vaginal bleeding and protrusion of a mass from the vagina of several years' duration. Physical examination showed a polyp protruding from the cervix, and a second degree prolapse of the uterus with a moderate sized cystocele and relaxed perineum present. X-ray study of the lumbosacral region showed a lack of osseous union between the lamina and spinous process on the left—first sacral segment, no spinous processes of the distal four sacral segments with lack of union in the neural arches posteriorly. Diagnosis was spina bifida of the first sacral segment, and spina bifida occulta of the second, third, fourth, and fifth sacral segments. Treatment of the prolapse was a dilatation and curettage, removal of the cervical polyp, Manchester colporrhaphy with amputation of the cervix, and a colpoperineorrhaphy. Recovery was uneventful, and the patient was discharged from the hospital on Jan. 20, 1944, in good condition.

Report of Cases

The following is a report of 19 cases of prolapse of the uterus occurring in nulliparous women, including the two cases reported above. There was a fairly equal distribution of

married and unmarried women in the series—eight being single and eleven married. The age range was from 28 years to 74 years, with an average of 55.3 years.

The prominent symptoms were frequency and burning on urination, protrusion of a mass from the vagina, moderate low abdominal discomfort, backache, tiredness, and some cases had slight to moderate vaginal bleeding. Duration of symptoms ranged from three weeks to twenty-three years.

Essential physical findings were as follows: six patients had first degree prolapse of the uterus, three patients had second degree prolapse, and seven had third degree prolapse. There were three cases showing elongation of the cervix alone, and six cases of elongation of the cervix were present associated with prolapse of the uterus. Moderate to large cystocele and rectocele were present in seven patients, rectocele alone associated with the prolapse appeared in two patients, and cystocele in two patients. Eight patients showed no cystocele or rectocele present, but three of these patients showed a relaxation of the perineum, and one patient a large enterocele.

The surgical treatment of prolapsus uteri in nulliparas is quite the same as in multiparas, and the results seem to be equally as good. All of our cases came to operation. The Manchester type of vaginal repair with perineorrhaphy was performed in ten cases, vaginal hysterectomy was done in four cases, and two cases were corrected by the abdominal approach, one with a vaginal amputation of the cervix and subtotal abdominal hysterectomy, the other corrected by a vaginal amputation of the cervix and an abdominal Coffey suspension of the uterus with no repair of the vagina performed. Three cases had a Sturmdorf amputation of the cervix and posterior colporrhaphy performed. A Watkins interposition operation was done in three cases associated with the Manchester type of repair.

Postoperative examination of thirteen of these cases, or 68.4 per cent of the series, has been made, and there has been no recurrence of prolapse, cystocele, rectocele, or urinary complaints, and the anatomic results have been good.

Summary

1. Nineteen cases of uterine prolapse in nulliparas are reported out of a total of 963 cases of prolapse of the uterus treated in the Elizabeth Steel Magee Hospital and the St. Francis Hospital, Pittsburgh, Pa., covering a period from January, 1934, to April, 1947.

2. Prolapsus uteri in nulliparas is an uncommon yet definite entity, and the series reported shows an incidence of 1.97 per cent. Associated with the prolapse is a relaxation of the pelvic supporting structures. Predisposing factors vary, and there seems to be an indication that neural disturbances with secondary muscular insufficiency of the pelvic floor, atrophy of the ligaments, connective tissue, and muscles contribute to the appearance of uterine prolapse in nullipara. One predisposition to prolapse is congenital, and in these cases where a congenital retroflexion or retroversion exists, subsequent trauma, poor nutrition in early life, faulty innervation, or intra-abdominal pressure may be the exciting cause. There is an element of infantilism in many cases, and the fact that these women are sterile is highly suggestive.

3. Spina bifida occulta should be considered as a possible predisposing factor in uterine prolapse appearing in a nulliparous woman. Nine cases were x-rayed for the presence of occult spina bifida and this condition was found in two cases, or 22.2 per cent. The percentage in this small series is lower than previously reported by others.

4. The presence of cystocele, rectocele, frequency and burning on urination, and relaxed perineum are commonly associated with uterine prolapse.

5. Treatment is surgical and essentially the same as in multiparas. Results are equally as good. The Manchester type of vaginal repair with or without amputation of the cervix and perineorrhaphy was the treatment of choice. Vaginal hysterectomy has also been done for the treatment of complete prolapse. Some degree of narrowing of the vagina or colpectomy may be done with these operations.

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THE OCCURRENCE OF SPINA BIFIDA AND HYDROCEPHALUS IN SIBLINGS

A Review of the Literature and Case Report

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OVERT spina bifida is an uncommon congenital defect which is estimated to occur only once in every 1,000 births.[1, 3, 4] Its occurrence three times in the same family is extremely unusual. When such an anomaly appears once, the obstetrician is frequently asked to give his opinion as to the probability of its recurrence in subsequent pregnancies. It is the purpose of this paper to review the literature dealing with this question and to present a case in which spina bifida and hydrocephalus appeared in each of three successive term pregnancies.

A thorough search of the literature reveals only 22 reported families in which overt spina bifida occurred in siblings. The first reported case appears to be that of Pendleton in 1857, cited by Shulman[5] and listed in the bibliography of Ingraham,[6] in which spina bifida occurred in three children of the same mother. In 1870, Menzies[7] in Edinburgh reported a similar case. Butler-Smythe[8] observed a family in which three children had spina bifida and two more were hydrocephalic. Sachs[9] reported that he had seen a family in which three children in succession had spina bifida. Pybus[10] cites a family in which all four children had defects, two with overt spina bifida, one with spina bifida occulta, and one with an exaggerated postanal dimple. Woltman[11] reported two cases in which two siblings had spina bifida. Three families with two spina bifida children in each were reported by Cutler[4]; in one of these, two additional children had hydrocephalus. In an exhaustive study of congenital malformations made by Murphy,[12] forty families were observed in which there were two or more defective children. In two of these families, spina bifida occurred twice, and, in one family, three children were affected. Murphy[13] also reported on nineteen families with multiple deformities, of which he had been informed by individual physicians. In one of these cases, spina bifida occurred in two children. Shulman[5] reported a case of spina bifida with meningocele in two successive siblings, and Penrose,[14] in a study of 137 families in which spina bifida had occurred, found three families in which the abnormality had occurred in two siblings.

Four sets of twins in which each individual was afflicted with spina bifida have been reported: Fry[15] reported the lesion in dizygotic twins which he had observed. One of these babies also had an associated hydrocephalus. Another pair was reported by Wright,[16] in 1899, in which both babies had a myelocele and were hydrocephalic. Quisenberry,[17] in 1944, reported a case of uniovular twins with spina bifida and myelomeningocele. Another pair of identical twins was reported by Eskelund and Bartels,[18] both children having spina bifida and several other malformations, but neither of which had hydrocephalus.

The present case makes a total of six in which spina bifida has occurred three times in the same family.

The patient was 26 years of age at the time of her first pregnancy in 1942. Her past history revealed no illness except the ordinary childhood diseases. Physical examination and Wassermann were negative. The husband had a deformity of one leg as a result of poliomyelitis, but otherwise history and physical examination revealed nothing abnormal. X-rays of the entire spine of both parents revealed no occult spina bifida or other abnormality except for a slight scoliosis of the lower dorsal spine of the husband. Both parents were Rh positive.

The first pregnancy was uneventful and labor began spontaneously at term. An abnormality of the fetal head was suspected during labor. Delivery was accomplished by low forceps. The baby was a girl weighing 3,800 Gm. Gross spina bifida and hydrocephalus were present clinically. About one hour after birth the infant died.

At autopsy the infant had a mongoloid appearance. A defect consisting of absence of the posterior processes of the vertebral column from T-10 to the sacrum was observed. Superficially this defect appeared on a soft area 8.5 cm. long and 5 cm. wide in greatest dimensions. The surface had a red, gelatinoid, raw appearance with only partial epithelialization of the margins. The head was deformed with a greatly increased occipito-mental diameter, and the anterior fontanelle was approximately three times larger than normal. The brain weighed 450 Gm. There was a tremendous dilatation of the ventricular system with numerous hemorrhages of the ependymal surface. Microscopically, pressure atrophy and focal hemorrhages of the cerebral hemispheres were evident.

Major Anatomic Diagnoses.—Congenital hydrocephalus; spina bifida (posterior rachischisis, T-10 to S-1) with hydromyelocele.

After five months the patient became pregnant again but spontaneously aborted at two and one-half months. The fetus was not examined.

In 1943 the third pregnancy occurred. There had been no illnesses during the intervening period. The basal metabolic rate was minus 11 per cent. Because of this, together with occasional spotting in the first trimester, small doses of thyroid were prescribed. The patient fell into labor spontaneously at term. The baby presented by the breech, and was so delivered. The birth weight was 3,100 Gm. The following defects were noted: lumbar spina bifida, hydrocephalus, bilateral equina valgus, flaccid paralysis of the lower extremities, and absence of sphincter control. The baby died twenty-eight days after birth.

Postmortem examination reevaled an emaciated female infant with an enlarged head and widely open sutures and fontanelles. The lower extremities were flexed at the hips and fully extended at the knees with fixation of these joints. Both feet were dorsally flexed and inverted. The posterior arches of the lumbar spine were absent and in this region there was a small soft protuberance 1.5 cm. in diameter over which the skin was ulcerated. Removal of the central nervous system revealed fibrous adhesions and areas of purulent inflammation in the region of the roof of the fourth ventricle. It was further evident that there was an outpouching of the meninges in the area of the spina bifida and that the spinal cord and the cauda equina were included in this sac. A prominent hydrocephalus was noted on opening the brain. All the ventricles were dilated and the cortex was thinned in some places to 5 mm. Microscopically, an acute leptomeningitis and ependymitis were seen.

Major Anatomic Diagnoses.—Lumbar spina bifida with myelomeningocele; arthrogryposis of the lower extremities; bilateral talipes calcaneovarus; fibrosis of leptomeninges of roof of fourth ventricle with infected hydrocephalus.

The last pregnancy was in 1946. She again spotted slightly during the early part of the pregnancy and was given progesterone and stilbestrol daily. Labor began spontaneously at term and a male infant weighing 4,042 Gm. delivered spontaneously. Findings at birth included a meningocele in the lumbar region, flaccid paralysis of the lower extremities, and absence of sphincter control. The hydrocephalus was progressive. Death occurred on the sixty-third day of life.

Autopsy revealed the body of a poorly nourished male child with a greatly enlarged head. The enlargement was most pronounced in the anteroposterior diameter. Both fontanelles and all the sutures were widely open. A defect of the posterior processes of the lumbar spine

was seen over which there was a large (7 by 4 by 3 cm.) thin-walled, fluctuant, and violaceous cystic sac. Examination of the brain showed a marked dilatation of the ventricles and a thinning of the overlying cerebral cortex. The skull showed numerous thin uncalcified areas. Microscopically, the sac in the region of the spina bifida was partially lined with nervous tissue.

Major Anatomic Diagnoses.—Lumbar spina bifida with myelomeningocele; severe hydrocephalus.

Discussion

A case is presented in which both spina bifida and hydrocephalus occurred in each of three successive term pregnancies. After the first pregnancy, the mother of this family sought the advice of her obstetrician regarding the possibility of such a malformation being repeated if she were to become pregnant again. Since the incidence of this defect is generally regarded as about one in one thousand, the possibility seemed remote that a repetition of this abnormality would occur in a second pregnancy. She was so advised. When the second term pregnancy resulted in the same type of defect, the physician was reluctant to advise further childbearing because of the apparent incompatible hereditary factors. However, the sincere desire of these intelligent parents for a normal living child appeared to justify another attempt, the results of which were the same.

In each of these three infants hydrocephalus accompanied the malformation of the spinal column. The association of these deformities has long been noted, and a satisfactory explanation for the cause of the hydrocephalus is not always apparent. In the infants in this case, the probable cause of the hydrocephalus was apparent in only the second child, in which meningitis in the region of the fourth ventricle might have caused an obstruction to the outflow of cerebrospinal fluid. In 1935, Russell and Donald[19] suggested that an abnormality of the hindbrain known as the Arnold-Chiari malformation, which sometimes occurs in association with spina bifida, might be responsible for the development of hydrocephalus. In the case presented there was no autopsy evidence of this malformation in any of the infants.

It was mentioned above that the appearance of spina bifida in siblings is rare, only 22 cases having been reported. However, once this defect has appeared twice, the probability of a third occurrence is high, for among these 22 families a third spina bifida occurred five times. On the basis of the meager literature which is available, it seems safe to advise the parents of a single child with spina bifida that repetition of such a lesion is very unusual and the probability of a normal baby is good. However, it would also appear that the parents of two such children have far less assurance that this defect will not appear a third time, and should be advised accordingly.

Summary

The literature concerning the occurrence of spina bifida in siblings is reviewed. A case is presented in which spina bifida associated with hydrocephalus occurred in three children of the same parents. Comment is made concerning the probability of recurrence of this malformation in subsequent pregnancies of the same family.

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TRANSVERSE PRESENTATION OF THE FETUS

An Analysis of 186 Consecutive Cases

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ALTHOUGH transverse presentation of the fetus has been a long-recognized abnormality, no extended series of this type of dystocia was analyzed before Eastman's paper in 1932.[1] Recently Alexander and Schneider analyzed a fairly large number of cases.[2] Prior to Eastman's paper, the Germans had been the main contributors to the literature on this subject, producing a long series of studies chiefly devoted to the optimum time for performing version in this abnormality. These covered a number of previous years when these cases were commonly handled by combined podalic version in all cases permitting the introduction of two fingers through the cervix, followed by a period of waiting for complete cervical dilatation, when extration was usually done. In 1886, Winter[3] called attention to the high fetal mortality associated with this practice, unless conditions permitted immediate delivery, and recommended doing version only after the os was fully dilated.

This study covers a series of 186 consecutive cases of transverse presentation which have occurred in Charity Hospital of New Orleans, from 1906 through 1945. During this time there were 89,526 deliveries, giving an incidence of 1 to 481 cases. Following the example of Eastman, we have omitted from the series cases which changed to a longitudinal presentation, whether spontaneously or as a result of external version, as we are not certain in these cases whether we are dealing with a true example of this condition. Eight cases of twins are included, in seven of which the second twin presented transversely with a prolapsed upper extremity in the vagina after the first baby had been delivered at home by a midwife. The other case was admitted with an upper extremity of the first twin in the vagina. Consequently all eight cases presented a true example of transverse presentation in one of the twins. The purpose of this study is to analyze the factors producing dystocia and the high associated fetal mortality, as well as the high maternal mortality and morbidity.

Etiology.—There were only 30 primiparas in the series, or 16.1 per cent of the total number of cases, although the clinic population of primiparas is usually near 50 per cent of all admissions. The striking role played by multiparity is shown in that 82 of the patients with this abnormality, or 44 per cent, had had three or more previous babies; 39, or 20.9 per cent, had had six or more; 14, or 7.5 per cent having had nine or more babies. The latter group comprise only a very small per cent of the total number of women delivered.

Of these 186, the etiology may be given, alone or combined, as multiparity (women having had three or more previous children), 82 cases; unknown, 54 cases (of which 26 were multiparas with no record of the number of babies

previously born); prematurity, 27 cases; multiple pregnancy eight cases; cephalopelvic disproportion, eight cases; placenta previa, four cases; bicornate uterus, previous uterine suspension, polyhydramnios, hydrocephalus and monstrosity, six cases. No cases were attributed to pelvic tumors, excessive size of the fetus, the introduction of a uterine bag, dead fetus, or pure accident, such as the premature rupture of the amniotic sac when the fetus lies in an abnormal presentation. The latter may have been an unrecognized cause in some cases, however, occurring before the fetus had assumed its normal longitudinal presentation. The less important etiologic role played by cephalopelvic disproportion and pelvic tumors is emphasized in this series.

Material Analysis.—In this series, there were 18 maternal deaths, or 9.6 per cent, and 75 cases of morbidity, or 40.8 per cent (Table I).

TABLE I. MATERNAL ANALYSIS

	NO. OF CASES	PER CENT
Maternal morbidity	75	40.8
Maternal mortality	19	9.6
Maternal average days in hospital		12.5 days
Multipara	149	80.1
Primipara	30	16.1
Unknown parity	7	3.7

The average stay in the hospital was 12.5 days. The youngest patient was 15 years old and the oldest 44 years. There were 42 patients (23.4 per cent) 20 years of age or less (Table II).

TABLE II. MATERNAL ANALYSIS

MATERNAL AGE	NO. OF CASES	PER CENT
(Youngest patient, 15 years)		
(Oldest patient, 44 years)		
20 years or less	42	23.4
21 through 30 years	68	37.9
31 or over	69*	38.5
Age not given	7	

*Of which 41 were 35 years or above, or 22.9 per cent.

There were 68 patients (37.9 per cent) 21 through 30 years, and 69 patients (38.5 per cent) 31 years or above, of which 41 (22.9 per cent) were 35 years or above, showing the increasing incidence of transverse presentation with the later years of childbearing and associated with increased parity.

Diagnosis and Management.—In many of these cases, the diagnosis of transverse presentation was not suspected prior to rupture of the membranes and prolapse of the cord or an upper extremity into the vagina. The patient was admitted to the hospital in this condition in numerous instances after being grossly mishandled on the outside. In many instances, the correct diagnosis was not made before the membranes ruptured, although the patient was in the hospital at the time. In other instances, the membranes were ruptured, either accidentally or deliberately, by the examining physician in the presence of an incompletely dilated cervix, thereby jeopardizing the life of the baby to a much greater degree. Many patients came into the hospital after long labors on the outside with intrapartal infection, varying degrees of cervical dilatation, and often a dead baby from prolonged labor or a prolapsed cord. Very few cases had the benefit of x-ray in the diagnosis of presentation. Some patients were in the hospital for several days before labor started, and the condition might have been corrected by external version, had it been

recognized. Seven cases of twins occurred in which the midwife delivered the first baby alive in the home and then sent the patient to the hospital because she was unable to deliver the second transverse twin. Five of these were stillborn.

Several cases had the membranes ruptured artificially to induce labor for various reasons without the attendant's realizing that he was dealing with a transverse presentation. The method of delivery was version and extraction in most of these cases but no instance was found where a manual examination of the uterus was made for possible rupture, although the latter was probably the cause of death in several instances, some proved by autopsy.

As in Eastman's series, cervical dystocia associated with incomplete dilatation after many hours of labor with ruptured membranes undoubtedly was responsible for much of the high fetal and maternal mortality. When these factors were combined with inadequate supervision of labor in the home and late admission to the hospital, intrapartum infection, death of the fetus in utero, and rupture of the uterus resulted in many instances. A typical case of such care is demonstrated in the following brief history.

CASE 4.—Unit No. 38-29055. The patient was a 29-year-old Negro para 6, who came to the hospital after several days of labor with a midwife in attendance. She had a dead baby with a prolapsed cord and was exhausted. Upon examination she was found to have a ruptured uterus with the baby free in the abdominal cavity. A laparotomy was done and the dead fetus and uterus removed. She expired on the second postoperative day of peritonitis in spite of blood and chemotherapy.

Analysis of Fetal Deaths.—Of the 186 babies weighing 1,500 Gm. or more, there were 27 cases in which the fetus was considered premature but viable, in that the weight was between 1,500 and 2,500 Gm., and the remaining 159 babies weighed 2,500 Gm. or more. Those weighing less than 1,500 Gm., although there were a number in the records, were not included, but classified as abortions.

Of the 27 prematures, there were 21 deaths, giving a mortality of 77.7 per cent while there were 99 deaths in the 2,500 Gm. or above group, giving a 62.2 per cent mortality. The corrected fetal mortality of both, omitting monsters, was 67.6 per cent. Of the 91 cases showing heart tones present on admission (Table III), there were 36 subsequent fetal deaths, or 39.5 per cent. Of these, 16 were delivered by cesarean section with four fetal deaths, or 25 per cent, and 75 delivered vaginally with 32 deaths, or 42.6 per cent.

TABLE III. ANALYSIS OF FETAL DEATHS

	NO. OF CASES	NO. OF FETAL DEATHS	PER CENT
Fetal heart tones heard on admission	91	36	39.5
Delivery by cesarean section	16	4	25.0
Delivered vaginally	75	32	42.6

As to the causes of fetal deaths (Table IV), early rupture of the membranes with 7 cm. or less of cervical dilatation (138 cases) was associated with 92 deaths, or 66.6 per cent. In 28 cases having premature rupture of the membranes, there were 21 deaths, or 75.0 per cent. There were 40 cases having prolapsed cords before delivery, with 29 (72.5 per cent) fetal deaths. The influence of the duration of labor in fetal mortality is emphasized in that, of 53 cases delivered within twelve hours of the onset of labor, there were 22 (41.5 per cent) fetal deaths; 49 cases delivered in between twelve and twenty-four hours of labor, resulted in 26 (53.0 per cent) deaths; while 63 cases delivered after twenty-four or more hours of labor resulted in the extremely high fetal loss of 58 (92.0 per cent) cases.

TABLE IV. CAUSES OF FETAL DEATHS

	NO. OF CASES	NO. OF FETAL DEATHS	PER CENT
1. Early rupture of membranes prior to 7 cm. dilatation	138	92	66.6
2. Premature rupture of membranes before labor	28	21	75.0
3. Prolapse of cord before delivery	40	29	72.5
4. Prolonged Labor			
a. Delivered within 12 hours of onset of pains	53	22	41.5
b. Delivered within 12 to 24 hours of onset of pains	49	26	53.0
c. Delivered after 24 hours of onset of pains	63	58	92.0
5. Admitted with ruptured membranes	114	90	78.9
Admitted with unruptured membranes	67	25	37.3

When delivery was attempted in the home, in 70 cases, there resulted 55 (78.5 per cent) fetal deaths. The extreme importance of maintaining the membranes intact during the first stage of labor in transverse presentation is strikingly shown in the 67 cases admitted with intact membranes, resulting in 25 (37.3 per cent) fetal deaths, while 114 patients admitted with ruptured membranes lost 90 (78.9 per cent) babies. As to the type of delivery and fetal loss, there were 139 patients delivered by version and extraction with 90 fetal deaths (67 per cent), while the 16 patients delivered by cesarean section lost 4 (25 per cent) babies.

In order to compare the results in the management of this abnormality, the whole group was divided into three sections of 62 cases each. In the first 62 cases (beginning 1906), there were 11 maternal deaths and 46 fetal deaths; in the intermediate 62 cases, 3 maternal deaths and 39 fetal deaths; in the most recent 62 there were 4 maternal deaths and 31 fetal deaths. Fifteen of the 16 cesarean sections were done in the last 62 cases. Though definite improvement is shown down through the years, there is room for considerably more in the last 62 cases.

Treatment.—Treatment should be based primarily upon: (a) early diagnosis of this abnormality of presentation, which is attainable only when one strives to make an accurate diagnosis of presentation in every woman at the beginning of labor. The x-ray should be used when in doubt; (b) external version, which may be possible before labor or early in labor, before the rupture of the membranes; (c) preservation of the bag of waters after labor starts until full dilatation, if possible, by avoiding artificial rupture, voluntary bearing down on the part of the patient, and possibly by the insertion of a vaginal (not intrauterine) bag at times, as recommended by Eastman, to make counterpressure against the membranes; (d) version and extraction only after complete dilatation of the cervix.

Cases presenting premature or early rupture of the membranes, with an undilated, thick cervix and a viable baby are best treated by cesarean section. Cases similar to these, but having had a number of hours of labor and a number of examinations, with the baby still in good condition, may also be sectioned by the Waters' technique if more children are desired, or by a Porro section if the patient is a multipara with several living children. Neglected cases with a dead fetus impacted in the pelvis are probably best handled by decapitation and delivery from below. Neglected cases with intrapartum infection in the presence of an undilated cervix may require hysterectomy on the unopened uterus, as a desperate resort. The free use of penicillin and sulfonamides in potentially or frankly infected cases is indicated.

Finally, the requirements for versions are emphasized as being a completely dilated cervix, no disproportion, a sufficient amount of amniotic fluid,

and a sound uterus. As stated by Eastman, the intrauterine bag as a means of cervical dilatation in early rupture of the membranes is usually very unsatisfactory, as it repeatedly fails to effect dilatation after hours of use and predisposes to "hour-glass" contraction of the uterus and intrapartus infection.

Summary

1. One hundred eighty-six consecutive cases of transverse presentation at Charity Hospital, New Orleans, La., are analyzed.

2. The factors producing the high fetal and maternal mortality are emphasized.

3. Two factors seem essential from a study of this series in the possible lowering of maternal and fetal mortality:

(a) An early diagnosis of the malpresentation present, and
(b) The more frequent use of cesarean section in early labor in these cases.

4. Transverse presentation, although occurring about one-half as frequently as placenta previa, produced a much higher fetal loss than the latter in this series. In fact, the fetal loss is only exceeded by the loss associated with rupture of the uterus. Any obstetric abnormality producing a 67.6 per cent fetal loss and a 9.6 per cent maternal death rate over a period of years deserves the most serious consideration.

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DYSONTOGENETIC MIXED TUMORS OF THE VAGINA

With Report of a Case of Sarcoma Botryoides

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SARCOMA botryoides of the vagina in children has been reported 81 times since Guersant reported the first case in 1854. Because of the rarity of this condition the reporting of another case was thought to be worth while. In 1944, Dwyer[1] reported the most recent case, and gave a fairly complete review of the literature. He pointed out that McFarland's articles,[2] together with their associated bibliography, are the most comprehensive to that date.

A search of textbooks on gynecology, pediatrics, and pathology reveals little information regarding these rare and interesting tumors. It is interesting to note that this particular type of vaginal tumor has been reported only in individuals under 22 years of age, with 60 per cent occurring under two years. There is no adequate explanation for this fact.

Etiology

McFarland stated that these tumors should be termed dysontogenetic, mixed tumors of the urogenital region. In collecting all the reports from the literature in 1935, he found a total of 74 cases confined to or primarily in the vagina, also a bewildering terminology containing 119 different names. He advocated the above term in an effort to clarify the situation and to include the entire class of neoplasms occurring in the urogenital system. He reasons that without the presence of indubitable muscular or cartilaginous elements or some other evidence of heterologous structures could they be correctly called mixed tumors. Of course he found many which were distinctly mixed tumors with a great divergence of appearance and structure, some firm, dense, fibroid, muscular, cartilaginous, or even osseous. Many others were soft, edematous, myxoid, polypoid, and cystic (botryoides) and it is this latter type that is considered at this time. As to etiology, McFarland thinks they should be regarded as springing from dislocated residual embryonal cellular material in close proximity to those structures that enter into the formation of the urogenital sinus. They should not be regarded as metaplasia as a rule, however, he does believe that some are homologous and arise from tissue elements normal to the part in which they occur.

Clinical Characteristics

Occurring predominately in early life, these tumors occur as a polypoid, grapelike mass filling the vagina and often protruding through the hymen. Many of these polypoid outgrowths contain cystic fluid due to edema, which causes them to present an almost transparent fleshy appearance, often dark red from intratumoral bleeding. Histologically, the vast majority are in an undifferentiated form consisting of round cells or spindle cells of a malignant nature, only rarely showing a more benign type. There is a thin layer of submucous connective tissue beneath which is the stroma of the tumor itself. At

times there may be large elements in whose protoplasm a delicate striation is visible, hence the name rhabdomyoma or rhabdomyosarcoma is given.

These tumors are further characterized by being extremely malignant, recurring rapidly after all known forms of treatment. They do not metastasize widely but grow by extension to the bladder and peritoneum, obstructing the urethra and bladder as well as the rectum. In the terminal state, they are foul and necrotic and cause frequent hemorrhages. Death usually results from uremia, infection, or hemorrhage. The prognosis is uniformly bad, death resulting usually within one year. The mortality rate for the entire group reported in the literature is over 95 per cent.

One case reported by Engelmann[3] in Germany in 1941 was apparently cured by radium.

Of the 31 cases analyzed by Neurnberger,[4] 16 were found springing from the anterior vaginal wall, 10 from the posterior wall, and 5 from the lateral walls.

Incidence

As stated above, a search of the literature reveals 81 cases of these vaginal tumors reported to date. However, there seems to be some discrepancy in this total number, since Curtis states that there were but 31 well-authenticated cases. However, McFarland, in 1935, states that there were 74 reported cases of the very soft and simple botryoides tumors of the vagina all occurring before the twenty-second year. In addition to these 74 cases, seven more were found, the last being Dwyer's case reported in July, 1944. The case here observed brings the total reported cases to 82. (Since this report was made in 1945, a few more tumors of this type have been reported.)

Treatment

Since the usual course of the tumor is, as in the case of the botryoid type, repeated recurrence, local invasion of the surrounding tissues, and death from obstruction of the urinary passages, little can be expected from operative treatment, and in almost all cases it fails, and the patient dies. Treatment by x-rays and radium offers no more. However, the case of Engelmann, in which radium was implanted into the tumor area and an apparent cure effected, is noteworthy.

Case Report

C. N., a girl, aged 22 months, who was first seen Sept. 10, 1944, presented a "bloody vaginal discharge." The discharge had been present for about two weeks and was of a light watery nature and non-irritating. Historical review by systems was lacking of any noteworthy findings. She had been a normal full-term infant at birth and had had none of the usual childhood diseases. She was the first born of apparently healthy parents with no family history of malignancy.

Physical examination showed a well-developed and well-nourished, ambulatory white child, apparently in excellent health. The temperature, pulse, and respiratory rate were within normal limits. The general physical examination was negative. Examination of the vulva revealed a thin, pinkish, watery discharge. When the child cried, a mass of pale, reddish, edematous, polypoid tissue protruded from the vagina, receding from view when she relaxed. A finger in the rectum could easily cause a large amount of this mass to protrude. The growth was friable, soft, bled easily, and was considered to be possibly a cervical or uterine polyp which had prolapsed at the introitus by a long pedicle. The pelvic organs could not be felt by combined rectal and abdominal palpation. No abnormal masses were noted otherwise in the pelvis. No abnormalities of the rectum were present. The blood count, sedimentation rate, and urine were normal, and the Wassermann was negative.

The patient was admitted to Southern Baptist Hospital on Sept. 17, 1944, and the following morning under drop ether anesthesia, the hymen was dilated to admit the index finger easily. The growth was found to be attached by a broad base along the posterior vaginal wall in the midline from just below the cervix to a point just above the hymeneal ring. The cervix and rest of the vagina were free of growths, when inspected after exposure with small right angled retractors. The tumor was easily curetted off at the base and the latter cauterized as deeply as possible, considering the proximity of the rectal wall. The pathologic report was rhabdomyosarcoma (Figs. 1 and 2).

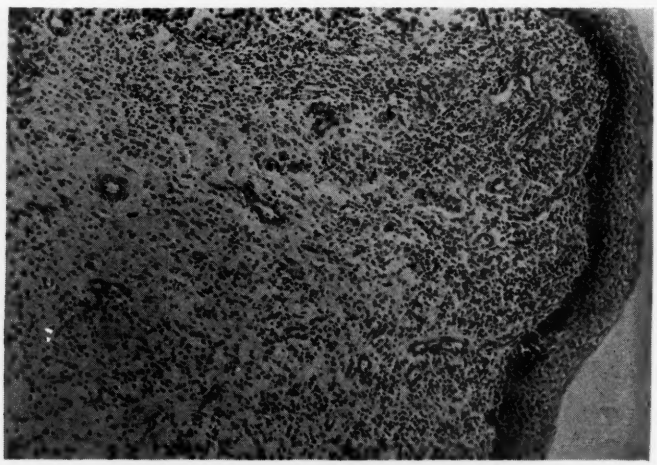

Fig. 1.—Low power showing stratified squamous epithelium on surface.

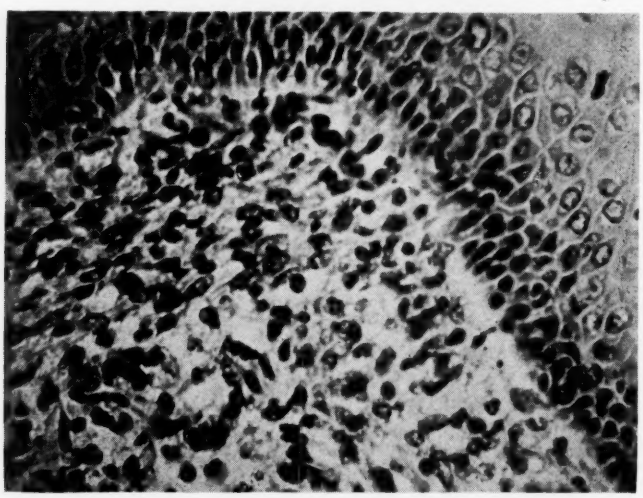

Fig. 2.—High power sarcoma botryoides of vagina.

The child subsequently received deep x-ray therapy. Radium was not used as it was felt that an effective dose could not be given due to the proximity of the rectal wall. Also to be considered was the technical difficulty of maintaining the radium in position were it used. The growth rapidly recurred within three months and again was protruding from the vagina as a necrotic, bleeding, friable mass, and the child rapidly declined in general health. Urinary obstruction, frequent hemorrhages, and terminal edema of the lower extremities preceded death, which occurred six months after she was first seen. No autopsy was obtained.

Summary

A case of sarcoma botryoides (rhabdomyosarcoma) of the vagina is reported in a 22-month-old child, and a review of the literature is given, and the etiology, nomenclature, etc., are considered. Much confusion exists as to etiology and nomenclature and McFarland's work has done much to clarify the situation.

These tumors are rare, many frequently occur in early life, and are almost invariably fatal in a relatively short time, as all the potentially malignant, and most of them actively so.

This class of tumor is thought to be relatively resistant to irradiation, although one case was apparently cured by implantation of radium needles. Surgical extirpation is followed by rapid recurrence as a rule.

I should like to express here my appreciation to Dr. Emil Novak for examination of specimens of this tumor, and his comments thereon.

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MANAGEMENT OF CHRONIC ENDOCERVICITIS IN INFERTILITY

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ONE of the requisites of absolute fertility is that the endocervical secretions be favorable to spermatozoa. Normally, the endocervical mucus enhances sperm migration. The endocervix is comprised chiefly of compound racemose glands lined with high columnar epithelium. These glands secrete mucus which undergoes cyclic changes, and is under the hormonal control of the ovary.[1, 2, 3] Abarbanel[4] not only observed these cyclic variations, but duplicated them in castrated women by means of estrogens alone and in combination with progesterone. Associated with the relatively rapid preovulatory increase in biologically active and available estrogens, there is a corresponding increase in the volume of the cervical mucus and a marked diminution in its viscosity. When the viscosity is least, sperm migration is greatest in number, ease of penetration, and duration of motility in the mucus. Following ovulation, the volume of cervical mucus decreases, the viscosity rapidly increases, and the spermatozoa are ordinarily unable to penetrate the mucus. It should be emphasized that because of these physiological variations, postcoital studies for sperm migration should be done at the estimated time of ovulation.

The endocervical mucus may become so altered as to be definitely hostile. This hostility to spermatozoa may impair motility and penetration.

Hamblen[5] lists the causes of cervical hostility as an abnormally viscid endocervical secretion resulting from chronic pelvic congestion, scanty coital secretion, endocervicitis, and poor cervical drainage with inspissation of the mucus plug due to a pinpoint external os. Chemical hostility (lowered pH) of endocervical secretion may result from infection and poor drainage. The cervix may be hostile due to incomplete cyclic preparation for insemination because of ovarian failure.

Chronic endocervicitis is probably the most common gynecologic disorder in women.[6] Fulkerson[7] checked records of 6,483 women examined in the gynecologic department of the Cornell University Medical School and found a diagnosis of cervicitis or endocervicitis in 33.16 per cent. Some authors[8] estimate the incidence of chronic cervicitis to be as high as 80 per cent. That chronic endocervicitis is a common cause of sterility has long been observed. It is the opinion of the authors that this condition is the most common cause of sterility, and that its importance has not been sufficiently emphasized. Reis and Bernick[9] state that cervical disease is the most common cause of sterility

in women, finding its existence in 60 per cent of 125 consecutive private patients examined. Fifty-six of these patients with cervical disease had endocervicitis. This was almost three times the frequency of salpingitis.

It is not our desire to discuss in detail the pathology of chronic endocervicitis, but it is important to emphasize that, in the presence of infection, the irritation stimulates the mucous cells to a hypersecretion with a marked increase in viscosity. Considerable study of sperm migration in mucus secreted from an infected cervix discloses that penetration is frequently either poor or absent, even at mid-cycle. This is not due to the presence of leucocytes, but is the result of a loss of fluid which accompanies the infection and increases the viscosity of the secretion from the endocervical glands.

Some degree of parametritis, perisalpingitis or salpingitis, and oophoritis is frequently associated with chronic endocervicitis, because of the ascending lymphangitis. This contributes to the sterility problem. It is highly doubtful that gonorrheal infection is as frequently a cause of chronic endocervicitis as has been commonly supposed. Traumatism of labor or abortion is a common predisposing cause. The infection in the cervix is usually mixed, with the streptococcus and staphylococcus predominant, and less commonly the colon bacillus, pneumococcus and various vaginal parasites. Our studies tend to confirm this impression.

No attempt will be made to evaluate in detail the various methods of treatment of chronic endocervicitis. To date, no one procedure fulfills all requirements for a cure of this infection. Electrotherapeutic measures such as cauterization, coagulation, and conization, and ionization with copper or zinc have been used with varying degree of success. These methods have certain disadvantages in dealing with sterility problems since they are aimed primarily at the destruction of the diseased cervical glands. Since normal endocervical secretions play an important role in sperm migration, a procedure directed at the infection itself and the conservation of functioning normal glands is highly desirable. Occasional beneficial results have been obtained with dilatation and curettage. Major surgical procedures such as trachelorrhaphy, low cervical amputation, Sturmdorf's trachelоplasty, Schröder's repair and high cervical amputation seldom are the procedure of choice in dealing with sterility.

With the advent of chemotherapy, a more desirable method of treatment of endocervicitis became available. Sulfonamides, both orally and locally, have been used by many investigators.[10] Palmer and Palmer[11] report 40 to 50 per cent success in curing endocervicitis, using one or two courses of sulfathiazole orally (6 Gm. daily for five days). When this treatment failed, a 10 per cent sulfapyridine solution was instilled into the glandular zone of the cervix with an improvement in their results. Dill[12] reports successful results by combining stilbestrol with sulfadiazine therapy. He believes the rationale of this therapy to be a combination of estrogenic enhancement of the resistance of the cervical mucosa with stimulation of overgrowth and the antibacterial effect of the sulfonamide drug. We have used sulfonamide therapy for many years with fairly satisfactory results.

During the past two years our attention has been directed toward the treatment of chronic endocervicitis with the intramuscular injection of penicillin in oil and wax as an office procedure. Recently, several investigators[13, 14] have reported encouraging results with the local application of penicillin in the treatment of cervicitis. Penicillin is also being used successfully in the treatment of pelvic inflammatory disease.[15, 16] One of us had the privilege of discussing a paper presented by Professor H. Lloyd of the University of Birmingham at the International Congress of Obstetrics and Gynecology recently, in which she analyzed comparative results using sulfonamides and penicillin in the treatment of sterility. She used a single dose of penicillin, 300,000 units, and reported successful results in 17½ per cent of her patients, in contrast to 20 per cent with the use of sulfonamides.[17]

The purpose of this communication is to report a series of 55 consecutive patients with chronic endocervicitis treated with this drug.* All patients selected for treatment had a thick, viscid, mucopurulent discharge escaping from the cervical canal. Bacteriologic and sperm migration studies of the cervical mucus were made.

Method

Our technique of administration and dosage of penicillin has varied somewhat as we have had opportunity to observe our results. Originally 300,000 units of penicillin-oil-beeswax† were administered into the gluteal muscles as the initial dose and two subsequent injections of 200,000 units each were given on alternate days. Our present procedure is to administer 300,000 units daily for three consecutive days for a total dosage of 900,000 units. Occasionally, it has been deemed advisable to repeat with a second similar course.

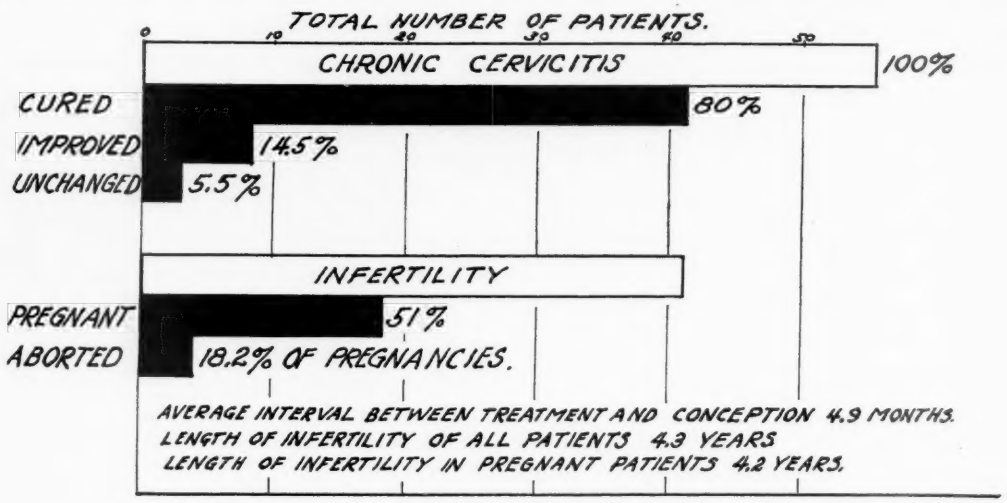

Fig. 1.

Results

A total of 55 patients with chronic endocervicitis was treated. Forty-one of the women consulted us because of infertility. The remaining fourteen, many of whom were single, did not desire pregnancy (Fig. 1).

*This series has been increased to over 200 cases with almost identical results.
†We now use procaine penicillin in sesame or peanut oil instead of beeswax.

Of the 55 patients with endocervicitis, 44 (80 per cent) were cured and 8 (14.5 per cent) were improved. Only 3 (5.5 per cent) patients showed no improvement. Twenty-one of the infertility problem patients conceived following penicillin therapy (51 per cent success). The average interval between penicillin therapy and conception was 4.9 months. To date, 4 of the pregnancies (18.2 per cent) have ended in spontaneous abortion. The average length of time of infertility for all 41 patients was 4.3 years. The patients who conceived following penicillin therapy had an average infertility period of 4.2 years, whereas the patients who have failed to conceive to date had an average infertility period of 4.4 years.

Discussion

The results in the treatment of chronic endocervicitis with penicillin-oil-beeswax were very dramatic. The response to this form of therapy is almost specific. In our hands, no other treatment has yielded such gratifying results, and there is the added advantage of its simplicity, safety, and conservation of the endocervical glands with no local tissue destruction. The unfavorable reactions of a more serious nature, which we encountered with penicillin-oil-beeswax, were generalized urticaria and high fever.* These occurred in only two of the 55 patients with no grave consequences. Not infrequently a local allergic reaction occurs at the site of injection, which is manifested by pain, redness, induration, and some itching. Hot, wet applications locally have proved effective. We have had no local abscess formation thus far. In patients who present a history of allergy, Benadryl or Pyribenzamine is given prophylactically. In our series, 16 of the patients had an associated chronic pelvic inflammation and all of these patients except one, showed definite improvement. In evaluating our results, we would like to emphasize the fact that there was practically no difference between the length of time of infertility prior to penicillin therapy in the 21 patients who conceived and the 20 patients who failed to conceive to this date.

Twenty of the patients in the sterility group presented a history of having been pregnant at least once before. In this group there were 12 successful pregnancies and 8 failures following treatment. Twenty-one of the sterility patients had never been pregnant before. In this group, there were 9 successful pregnancies following treatment and 13 failures. The male factor alone could definitely be held responsible for two of these failures. No patency tests were done on any patient with chronic endocervicitis until the infection was cleared up. Following penicillin therapy, only two patients had complete tubal occlusion which was confirmed by hysterosalpingography. Four of the patients had a definite cervical stenosis.

Our studies seem to indicate that abortion, both spontaneous and induced, plays an important role in the etiology of both chronic endocervicitis and sterility. A history of abortion was elicited in 15 of the 55 patients treated for chronic endocervicitis. Of the 41 sterility patients, 13 had had at least one previous abortion. In the group of 21 successfully treated sterility

*These have been almost eliminated since the use of procaine penicillin in oil.

cases, four spontaneous abortions occurred. This closely approximates the incidence of spontaneous abortion in an average group of obstetric patients.

Our bacteriologic studies again confirm the fact that the organisms present in chronic endocervicitis are a mixture predominantly of streptococci and staphylococci, and less commonly *B. coli* and pneumococci. In only one instance was the gonococcus proved to be responsible for the infection.

Sperm migration studies consistently revealed little or no sperm penetration even during the ovulation phase. Following treatment with penicillin-oil-beeswax, normal sperm migration was almost invariably observed.

Summary and Conclusions

1. Chronic endocervicitis is a very common cause of infertility.

2. Abortion, both spontaneous and induced, is an important factor in the etiology of chronic endocervicitis and sterility.

3. Bacteriologically speaking, chronic endocervicitis is most often caused by a mixture of the common pathogenic organisms other than the gonococcus.

4. Penicillin-oil-beeswax administered intramuscularly is almost a specific form of therapy in the treatment of chronic endocervicitis.

5. With the disappearance of the infection, there is a return of normal sperm migration in the endocervical secretions.

6. The use of penicillin-oil-beeswax is a valuable therapeutic agent in the management of the sterility problem.

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INVASIVE HYDATIDIFORM MOLE*

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THERE is a small group of cases of mole about which pathologists will differ in the microscopic diagnosis and be unable to give us a positive diagnosis as to the relative malignancy of the molar tissue. To these cases such terms are applied as malignant mole, chorionadenoma destruens, or locally invasive mole. These tumors rarely, if ever, give rise to clinical evidence of metastasis; therefore, the prognosis is excellent, provided that the uterus is removed. They are characterized clinically by variable amounts of uterine subinvolution, postmolar bleeding, and usually persistently positive tests for chorionic gonadotropic hormone.

Chorionadenoma destruens, or locally invasive mole, may run a clinically benign course; but it is recognized that such a condition may ultimately kill the patient by uterine perforation, sepsis, or hemorrhage, even though there is no clinical evidence of metastasis.

Chorionepithelioma is such an exceedingly rare disease that even in some large clinics it has never been seen.

B. H., white, aged thirty-seven years, gravida iv, was first seen in the office May 10, 1946. She stated that she had noticed a brownish discharge on two occasions and that three weeks before her visit, she had felt a mass in the left lower abdomen. The mass was progressively enlarging and the pain becoming progressively worse.

A vaginal examination revealed a cystic mass approximately 8.5 cm. in diameter in the left lower quadrant and distinct fullness in the right lower quadrant. The cervix was soft and closed. Although her last menstrual period was February 14, the uterus was approximately the size of four-plus months.

On May 12, she was admitted to the Polyclinic Hospital because of severe pain in left lower quadrant of the abdomen. The preoperative diagnosis was that of a twisted ovarian cyst complicating pregnancy. She was operated upon May 15th. The uterus was found to be enlarged to the size of a four months' pregnancy; the left ovary was cystic, about 8.5 cm. in diameter, with one complete twist in the pedicle; the right ovary was also cystic and about 10 cm. in diameter. We performed a bilateral oophorectomy. (The pathologic report was luteal cysts of the ovary, some with hemorrhage.)

Five days later, the patient aborted a hemorrhagic mass on which the gross pathologic report was "hydatid mole." The microscopic pathologic report was "necrotic hydatid mole."

On May 25, a dilatation and curettage were performed, a small portion of mole was removed with a sponge stick, and the uterus was thoroughly curetted with a sharp curette and given a firm uterine packing. The pathologic report on this portion of mole and curetting was "hydatidiform mole with infection and anaplasia."

On June 1, the patient was discharged from the hospital, stating that she "felt very good, except for a little weakness." The cervix was closed; and the uterus was involuted to the size of a normal multiparous uterus, mobile and not tender. On June 12, she again came to the office, stating that she felt stronger and had no bleeding. The cervix was closed; the uterus was well involuted, mobile, and not tender. Arrangements were made for a Friedman test to be done within the next six weeks.

On July 22, she was readmitted to the hospital because of jaundice and a vaginal bleeding of one week's duration. She was markedly jaundiced, the conjunctiva and the whole body were deeply icteric, and the liver was apparently enlarged to one fingerbreadth below the costal margin. A smooth, tender swelling was just palpable above the symphysis pubis.

*Read before the Section of Obstetrics and Gynecology, New York Academy of Medicine, April 27, 1948.

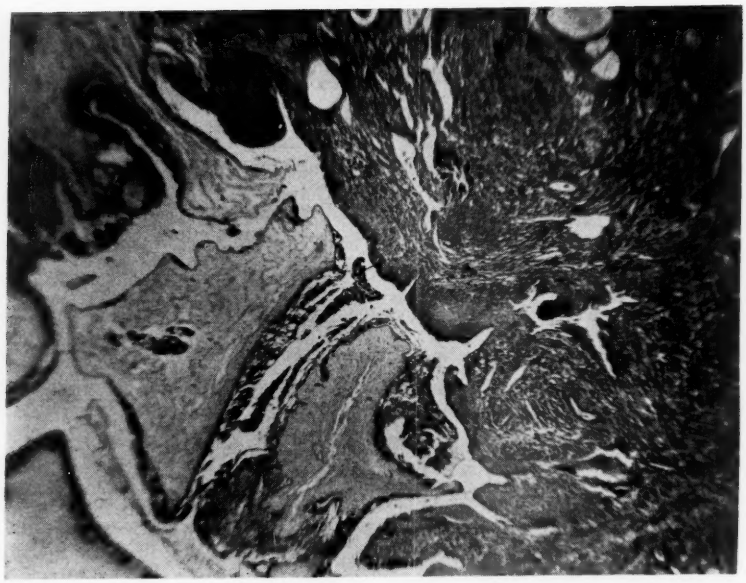

Fig. 1.—This represents mole and wall of uterus. The line of contact between them does not show evidence of decidua, even though there is a narrow zone of fibrinoid degeneration, similar to the so-called Nitabuchs layer which usually represents dividing line between placenta and decidua. Relation of mole to uterus in this case is similar to that found in placenta accreta.

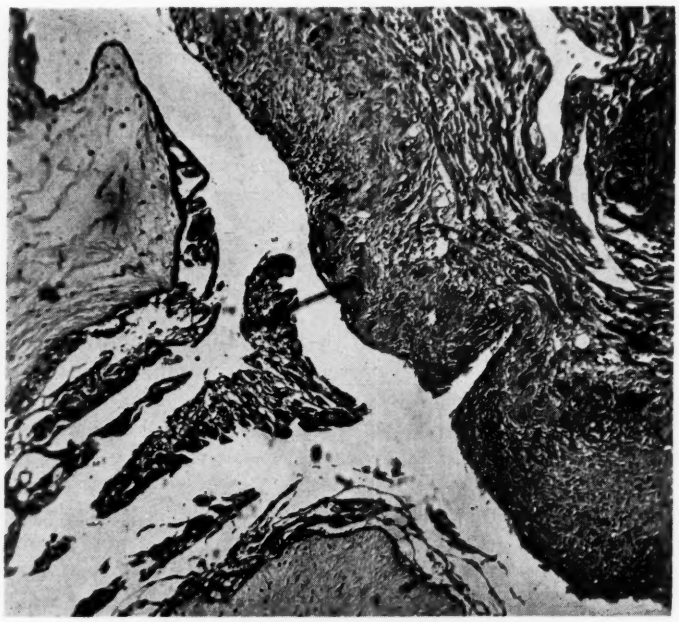

Fig. 2.—Shows invasive mole. High power field. Shows same relation between mole and wall of uterus as mentioned above. Note the very loose, almost liquified stroma of large chorionic villi, complete absence of blood vessels and evidence of excessive proliferation of chorionic epithelium which form not two but several layers.

Fig. 3.—This shows more pronounced invasive tendencies of mole and close relationship between mole and myometrium. Note scarcity of villous pattern of mole which shows only in few instances formed villi. Most of the mole in this area consists of excessive overgrowth epithelium.

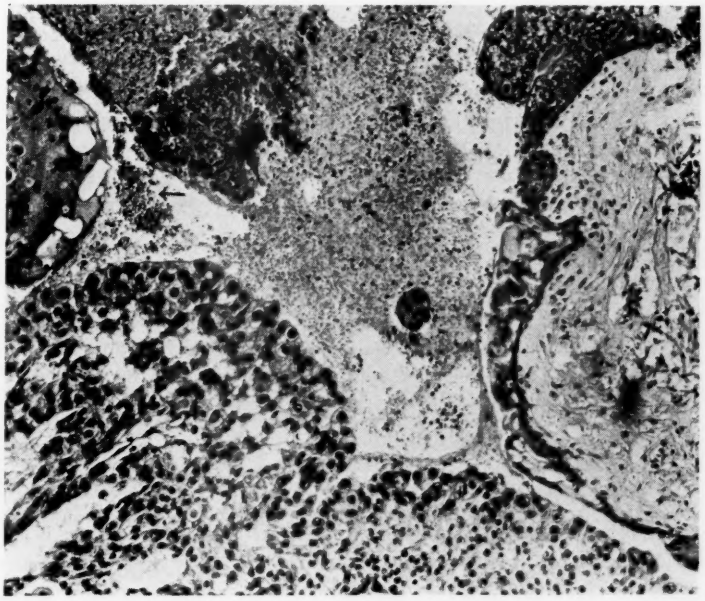

Fig. 4.—High power. This shows marked proliferation tendencies of chorionic epithelium which reveals striking resemblance to early trophoblast.

Arrow indicates a segment which shows very well the formation of syncytium. Rest of chorionic epithelium shows striking resemblance to cytotrophoblast.

Pelvic examination revealed moderate free bleeding from the cervix, which was soft and patulous. The uterus was uniformly enlarged to about twice the normal size and was soft in consistency. An internist, called in consultation, instituted symptomatic treatment of the jaundice. X-rays of the gall bladder revealed no evidence of dye. The liver was not enlarged. An x-ray of the chest showed no evidence of metastasis in bony cage, pleura, or lungs. These findings confirmed the clinical diagnosis of obstructive jaundice; the etiology remained obscure and any connection with the pelvic condition, a matter of conjecture. The jaundice began to diminish under treatment, and, by August 2, we decided that clinical and laboratory findings permitted operation. The pelvic condition was not treated per se; the vaginal bleeding continued intermittently in small amounts. Several rabbits died before a Friedman test was completed, but finally, on July 31, a completed one proved positive. On a quantitative Aschheim-Zondek done elsewhere, a verbal report was given on "2,000 mouse units per litre of urine."

The preoperative diagnosis was that of chorionepithelioma, or recurrent hydatidiform mole. A total hysterectomy with bilateral salpingectomy was performed. The uterus was found to be uniformly enlarged and smooth. After it had been incised, we found, attached to the fundus, a small hemorrhagic growth about 4 cm. in diameter.

Pathologic Report: The microscopic examination shows uterus, tubes, and parametrial tissue. The uterus is invaded by chorionic masses covered by pleomorphic hypertrophic cells with hyperchromatic nuclei, some with bizarre shapes. Several areas show vascular channels dilated by atypical masses. The tubes show hyperemia, edema, hemorrhages, and polymorphonuclear and mononuclear infiltrations. The parametrial tissue shows similar changes as well as the presence of numerous foreign-body types of giant cells.

The pathologic diagnosis was chorionepithelioma of the uterus and cystic dilatation of the cervical glands. The slides were shown to two other pathologists, who diagnosed recurrent hydatidiform mole. Dr. Arthur Hertig stated that he had made a diagnosis of chorionadenoma destruens, with a good prognosis.

Follow-up.—On September 4, the patient came to the office and stated that she had no complaints. The vaginal vault was found to be well suspended with no thickening or tenderness apparent. An x-ray of the chest and long bones done on September 24 revealed no evidence of metastasis. On November 22, she came again and complained then of a feeling of depression. Her weight was 112½ pounds; she had had several abscessed teeth extracted. On March 17 she stated that she felt very well and had no complaints. Her weight was 126, a gain of 13½ pounds since her last visit. She slept well and had a good appetite. Her hemoglobin was 76 per cent. She had an occasional flush. The vaginal examination was negative, and the Friedman test of April 23, was negative. On June 21, she stated that she was feeling very well and had no complaints; her weight was 128 pounds. Hemoglobin 82 per cent, blood pressure 130/88, and the vaginal examination was negative. She was last seen November 5, she stated that she was feeling very well and had no complaints; her weight was 138½ (a gain of 26 pounds since her operation), hemoglobin 82 per cent, blood pressure 134/80, and the Friedman test of November 12 was negative.

Summary

This is a case of invasive mole treated by complete hysterectomy and removal of the remaining appendages. Although on the patient's first admission to the hospital, the possibility of a hydatidiform mole was considered, the primary cause of her admission to the hospital was abdominal pain on the left side and the presence of a progressively enlarging mass. Since removal of both ovaries would probably be followed by miscarriage, religious considerations precluded further interference. After spontaneous expulsion of the mole, curettage, and exploration of the uterus, bleeding ceased and the patient was discharged from the hospital. When she was readmitted suffering from jaundice, enlargement of the uterus, and vaginal bleeding, the picture was one of suspicious malignancy, probably chorionepithelioma. After the clearing of the jaundice and the negative x-rays of chest and long bones,

the markedly positive Friedman test and continued intermittent vaginal bleeding made a total hysterectomy with removal of the tubes appear the operation of choice, because a chorionepithelioma could not be discounted.

The final diagnosis is not easy. Two outstanding pathologists have examined the specimen carefully and feel that such invasiveness as can be found is definitely limited and not characteristic of a true epithelioma. Although the patient's course in the beginning was suspicious of malignancy, fortunately it turned out to be clinically benign.

Since it appears that there are various histologic or clinical grades of chorionic malignancy, rather than designate them all as chorionepithelioma, we must try to distinguish between them. Also, every patient harboring a hydatidiform mole should be individualized.

Management of these cases consists in the diagnosis and removal of malignant chorionic tissue while it remains localized in the pelvis and the avoiding of unnecessary surgery during the childbearing age because of the possibility that malignant chorionic tissue might be present. We must approach the problem very carefully, studying the clinical picture of each case, making a careful study of the microscopic traits of tissue that were removed or expelled, and making careful hormone studies. With critical evaluation of all factors, it will usually be possible to arrive at a more precise individual diagnosis.

GRANULOSA CELL TUMOR CONTAINING GLANDULAR STRUCTURES

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THE occurrence of glandular or tubulelike structures in granulosa cell tumors is unusual. The term "tubular" has been loosely used in the past to designate two distinct histologic types of granulosa cell tumors, neither of which contain tubulelike structures. Some authors speak of the columns of tumor cells between the stromal bands and cylinders of the cylindromatous granulosa cell tumors as tubulelike in arrangement. Others liken the exaggerated Call-Exner bodies in the microcystic folliculoid granulosa cell tumors to tubule- or glandlike structures. The tumors herein reported, however, are neither of the cylindromatous nor microcystic folliculoid type. Although Schiller[1] states that tubular structures have been observed in granulosa cell tumors and in the *folliculome lipidique of Lecène,* there is no record of this phenomenon in the available literature.[2, 3] A number of tumors originally classified as granulosa cell tumors with glandular or tubular structures have, upon re-examination, been re-classified as arrhenoblastomas or gynandroblastomas.[1] The case herein presented, however, fulfills many of the clinical and cytologic criteria of a granulosa cell tumor and must, therefore, be classified as such in spite of the unusual histology and somewhat atypical gross appearance and distribution.

M. L. (Hosp. No. 47-3277), a 67-year-old married white housewife, was admitted to Deaconess Hospital on the service of Dr. F. Hofmeister on June 23, 1947, complaining of vaginal bleeding and urinary dribbling, dysuria, frequency, and urgency. The vaginal bleeding began one month before admission, and initially consisted of but a small amount of bright red blood daily. The bleeding progressively increased in severity until at the time of entry when it was continuous. The patient had had seven children, and had experienced a normal menopause at the age of 50 years, seventeen years before admission. There had been no bleeding during this interval. The history was otherwise noncontributory.

Physical examination revealed a somewhat obese female. The blood pressure was 130/80, pulse 80, respirations 20, and temperature 98.6° F. The skin was soft and smooth, and the hair had a normal female distribution. The breasts were atrophic, and the patient had noted no recent changes in them. Remarkable physical findings were otherwise confined to the pelvis and perineum. There was some relaxation of the perineum with a moderate cystocele. The cervix was clean except for a small amount of blood in the os. The uterus was long, slightly enlarged, soft, and in normal position. A firm egg-sized mass was palpated bimanually in the region of the right ovary. The left ovary could not be felt.

All laboratory examinations were within normal limits. No hormone assays were done.

A preliminary diagnosis of adenocarcinoma of the endometrium was made but, because of the palpable ovarian mass, the possibility of a feminizing ovarian tumor was also entertained.

On June 24, 1947, the patient was operated upon under general anesthesia. A preliminary dilatation and curettage produced only a small amount of atrophic endometrium. The abdomen was, therefore, opened, and the bilateral ovarian tumors described below were found. The complete uterus, Fallopian tubes, and ovaries were removed.

The patient made an uneventful postoperative recovery. She was discharged on July 7, 1947, the fourteenth postoperative day. Nine months after discharge she was in apparent good health.

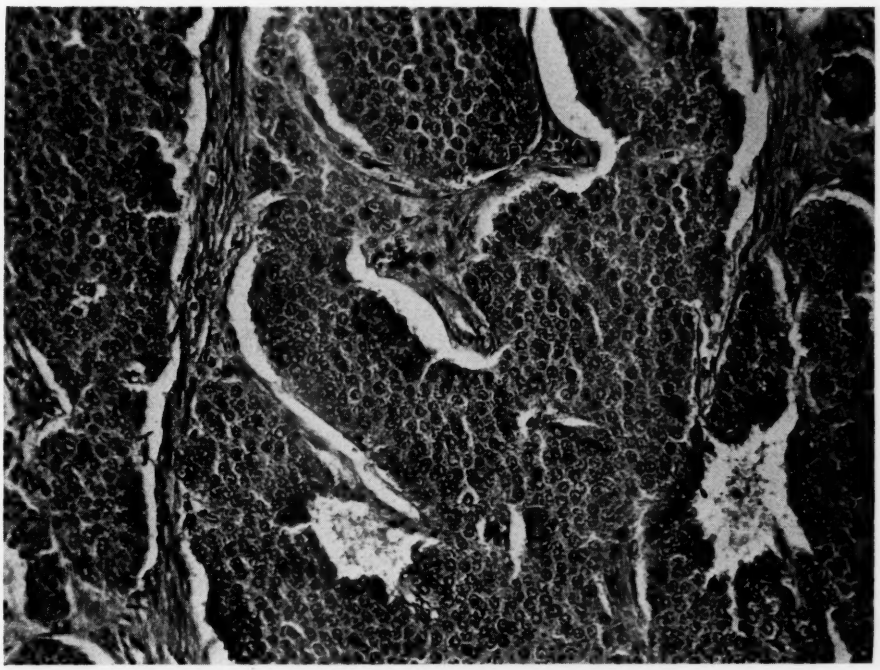

Fig. 1.—(×400.) Parenchymatous masses of granulosa cells. Note the absence of Call-Exner bodies.

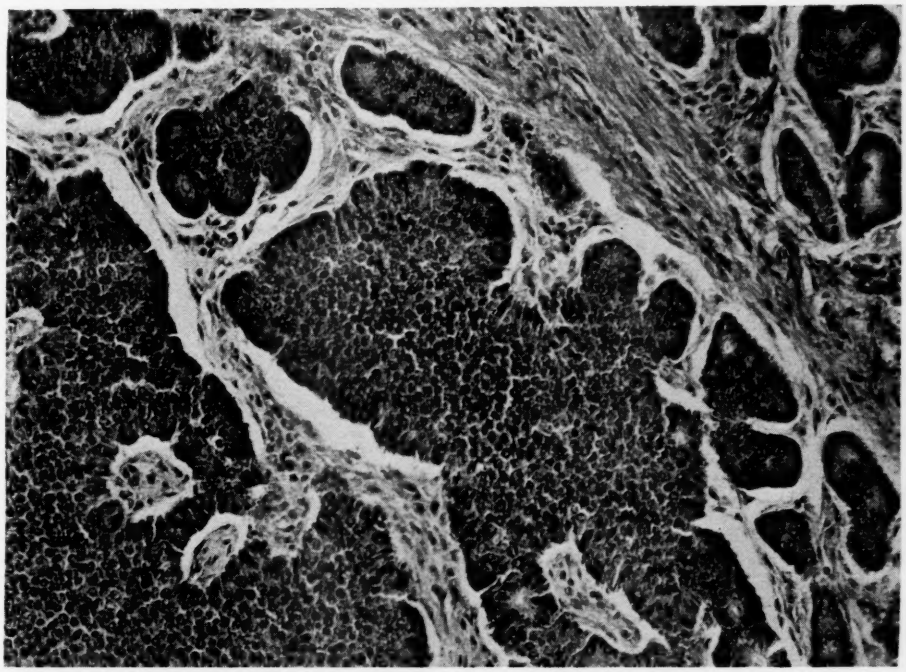

Fig. 2.—(×400.) Masses of granulosa cells showing peripheral gland formation and glands in separate groups.

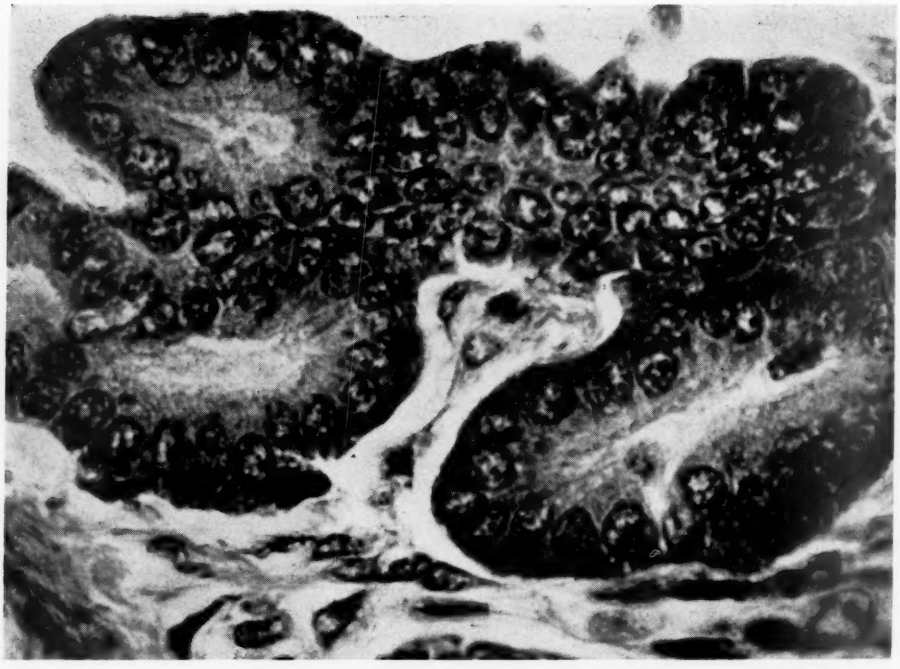

Fig. 3.—(×700.) Small group of tubular glands.

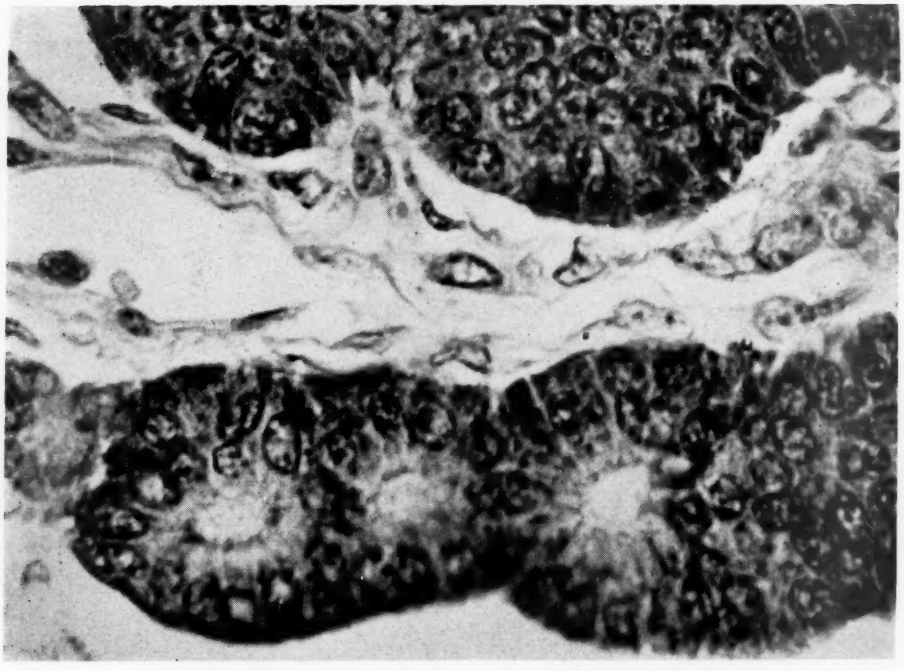

Fig. 4.—(×700.) Group of small glandular structures and the edge of a compact mass of granulosa cells.

Pathologic Findings

The specimen consisted of a few fragments of endometrium embedded in coagulated blood, and a complete uterus together with the tubes and ovaries. The uterus measured 11 by 5 by 3.5 cm. The surface was smooth. The myometrium was firm and somewhat thickened, measuring 1.5 centimeters. The endometrium was almost completely denuded. The endometrial surface was covered by a few shreds of recently coagulated blood. The cervix appeared normal. Both Fallopian tubes were thin and atrophic.

The ovaries were enlarged, smooth, and firm. The right measured 5 by 3.5 by 3 cm., and the left 4 by 3 by 2.5 centimeters. On section, both ovaries were almost completely replaced by well-circumscribed round tumor nodules: two in the right, 1 and 4 cm. in diameter, respectively, and one in the left, 3 cm. in diameter. The nodules presented a similar gross appearance. They were very well circumscribed and could be easily shelled out from the surrounding thin layer of compressed ovarian tissue. The cut surfaces neither bulged nor retracted, and were of a pale, definitely yellow color. The tumor tissue was slightly whorled and firm, except for several small areas of hemorrhagic softening.

Microscopically, the uterus displayed only a few fragments of atrophic endometrium in the proliferative phase. The myometrium showed atrophic changes of the senile type. The uterine curettings were few in number and essentially similar to the few fragments in the uterus. There was no evidence of endometrial hyperplasia, and the source of the uterine bleeding could not be determined.

All three ovarian tumor nodules were of identical microscopic structure. They were composed of small masses of tumor cells supported by a moderately abundant connective tissue stroma (Fig. 1). The masses appeared to shrink away from the stromal trabeculae. The tumor cells were small and stained moderately dark with hematoxylin. They displayed narrow halos of homogenous cytoplasm about small round or slightly ovoid nuclei. The chromatin network was rather coarse, and there were no nucleoli. Mitoses were rare. The cells were arranged in rather dense parenchymatous masses in some places but in others formed small glandular or tubulelike structures (Figs. 3 and 4). Here the cells were of a more columnar type with a small amount of cytoplasm on the luminal side of the basal nuclei. The glands were usually empty, but occasionally contained a small amount of pale pink material. They occurred at the periphery of the more cellular masses or in irregular groups and columns separate from the parenchymatous masses (Fig. 2). In no instance could they be found in the center of the masses. No Call-Exner bodies were found and the glandular structures bore no resemblance to them. The fibrous stroma of the tumor was moderately cellular. It was composed principally of elongated fibrocytes and a few younger connective tissue cells. The cytoplasm of these cells occasionally showed a fine vacuolization.

Fat stains on frozen sections were uniformly negative. Lipoid could neither be demonstrated in the tumor cells nor in the fibrous stroma.

Stains for argentophile cells using the Hamperl modification of Masson's silver method were similarly negative.

Comment

Were it not for the glandlike structures these tumors would be classified simply as granulosa cell tumors of the diffuse or parenchymatous type. This interpretation is strengthened by the history of postmenopausal bleeding and by the cytology of the individual tumor cells. The occurrence of glandlike structures, however, makes interpretation somewhat more difficult. The definitely yellow gross appearance, the arrangement of tumor cells in solid masses with peripherally located glands, and the occurrence of isolated columns and groups of glands all suggest a carcinoid tumor such as might be seen in the gastrointestinal tract. This possibility was seriously entertained, but repeated attempts failed to demonstrate the argentophilic nature of the tumor cells. Similarly, negative fat stains mitigate against a diagnosis of *folliculome lipidique*. Schiller, however, believes that the Lecène tumors develop in two phases; first, the establishment of the structure, and second, luteinization associated in some

cases with adenopapillary proliferation of the glandular elements. Granting this assumption, these tumors might be classified as Lecene tumors prior to luteinization. The failure of luteinization is apparently due to an absence of the luteinizing gonadotropic hormone, Prolan B, in a woman of 67 years.

Summary

A case of bilateral granulosa cell tumors containing glandular structures is reported.

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PREGNANCY COMPLICATED BY MASSIVE SUBCUTANEOUS EMPHYSEMA OF MEDIASTINAL ORIGIN (HAMMAN'S SYNDROME)*

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ACUTE mediastinal emphysema is a rare and unusual complication in pregnancy. When it does occur, it might demand special types of medical, surgical, and obstetric management. The case reported herewith is the first known to have occurred on this obstetric service in the past twenty years. Air may reach the mediastinum by four routes: (1) along the fascial planes of the neck, (2) through a perforation of the tracheobronchial tree, (3) from the retroperitoneal space, and (4) from the interstitial tissues of the lung.[1] The following is the case report:

Mrs. A. P., a 19-year-old white primigravida, was admitted to the obstetric service of Cook County Hospital on March 17, 1947, at 9:25 A.M. Inspection revealed an apprehensive woman with cyanosis, dyspnea, gross puffiness of her face and neck, the left palpebral fissure three-fourths closed, and marked injection of both sclerae (Fig. 1).

History revealed the sudden onset of an almost continuous cough which began thirty hours before admission. This was followed by a smothering oppressiveness behind her sternum, associated with diffuse pains throughout her chest and shoulders. Respirations became rapid, and as the day wore on, she had to exert an active effort to breathe, which caused her to become alarmed. Sedation and cough mixture had little or no effect on the patient. Her rest during the night had been fitful, and the complaints continued unchanged. Previous medical, surgical, and familial histories were noncontributing. The expected date of delivery was June 15, 1947.

Upon examination, the most significant findings were an extensive subcutaneous emphysema which included the face and neck anteroposteriorly, the right side of the breast anteriorly, and the scapula posteriorly. On the left side this emphysema involved the trunk, the left shoulder, arm, and hand. Crepitation was palpated throughout all of these areas. The heart findings were normal. There was a gravid uterus at the level of the umbilicus. The fetal heart tones were 156 per minute. X-rays likewise showed this extensive subcutaneous and mediastinal emphysema (Fig. 2). The blood pressure was 112/50, the pulse was 92, the temperature was 98.6° F., and the respirations were 24.

At first the treatment was conservative, and included nasal oxygen, sedation, and supportive measures, together with watchful expectancy. After twenty-four hours the patient was more apprehensive, her respirations were more labored, and an extension of the subcutaneous emphysema now included practically all of her trunk. The patient was seen in consultation by Dr. Lindon Seed of the attending surgical staff. He advised an attempt to be made to release the emphysema through an incision at the manubrium sternum. This incision was made under local anesthesia; it was three-fourths of an inch in length over the manubrium sternum and released the air beneath the skin. Thus a large quantity of the entrapped air immediately escaped through this opening. Bubbles were formed in great profusion as the air rushed out. A rubber dam was sutured in the incision to allow more air to escape.

*Read before the Chicago Gynecological Society, Oct. 13, 1947.

The relief was immediate and dramatic. The patient appeared virtually deflated and comfortable for the first time. In a period of seven days, the patient made remarkable improvement. She was discharged free of her complaints and in good condition. There were no subsequent recurrences or sequelae. To avoid irritation of the tracheobronchial tree, smoking was strictly interdicted, and every precaution to avoid an upper respiratory infection was practiced.

Fig. 1.—Photograph showing areas of subcutaneous emphysema above and to the left of the inked line, anteroposteriorly.

Lightening occurred about the first of June, and labor began at 12:30 A.M. on June 13. For this case the management of the labor consisted of sedation of the mother during the first stage, employing a morphine sulphate-scopolamine hydrobromide routine; and in the second stage an elective forceps delivery as soon as feasible to particularly avoid bearing down because of the secondary strain that involves a pulmonary effort. Together with the latter thought to avoid any recurrence of the mediastinal and subcutaneous emphysema, it was necessary to choose an anesthesia that we believed might prevent the bearing down effort in the second stage and at the same time not irritate the tracheobronchial tree. Therefore, a low spinal anesthesia (saddle-block) was administered when the cervix was 8 cm. dilated. After thirteen and one-half hours of first stage labor, the cervix was completely dilated, and a female baby weighing 6 pounds 5½ ounces was then delivered by a low forceps aided by an episiotomy. Post partum course was uneventful, and the patient was discharged in good condition on her fifth hospital day. Six weeks follow-up found the mother and baby in sound health.

Discussion

Caldwell[2] has suggested that this clinical entity be called "Hamman's Syndrome" because of the excellent and extensive clinical material on this subject that was collected by Louis Hamman of Baltimore.

The pathologic anatomy of interstitial emphysema of the lungs was first described by Laennec.[3] The first case was described by Simmons in 1783.[4] Since then there has been a

growing interest on this subject, with special attention being focused on the differential diagnosis of this syndrome from other conditions presenting acute thoracic complaints.

The etiology of the mediastinal and subcutaneous emphysema in the present case reported was apparently due to the sudden onset of coughing which produced an increase in the intrapulmonary pressure, causing a forceful distention of the lungs. This has been offered as one possible cause for this entity by Hamman,[1-3] and Schwartz, McIlroy, and Warren.[5] Joannides and Tsoulos[6] have proved this in their experiments on the dog, and they have gone on to show the pathogenesis of this process, plus the possible very serious complication of an air embolism.

Classically, Hamman's Syndrome is characterized by (1) pain, (2) subcutaneous and retroperitoneal emphysema, (3) obliteration of cardiac dullness, (4) peculiar sounds heard over the heart such as crunching, crackling, or bubbling sounds with each contraction, (5) evidence of increased mediastinal pressure, dyspnea, cyanosis, engorged veins, circulatory failure, (6) pneumothorax, and (7) roentgenographic evidence of air in the mediastinum.[1] The case here reported meets all the clinical and laboratory demands of this condition, except that the heart was without findings.

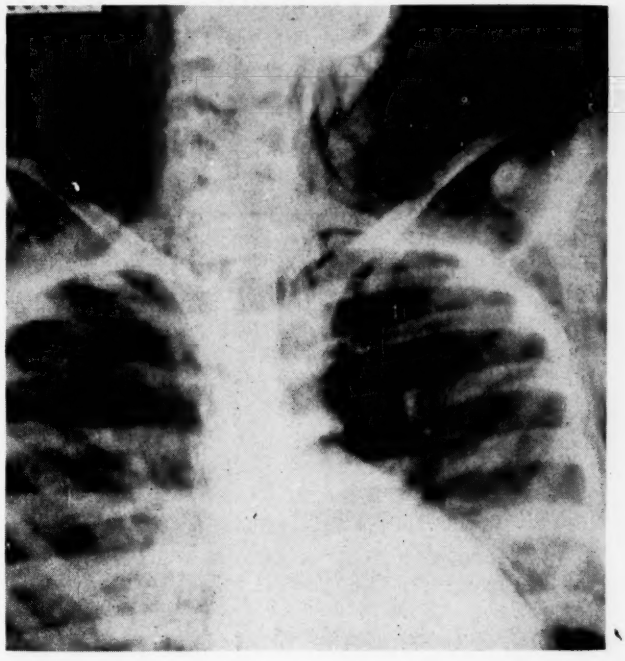

Fig. 2.—Anteroposterior view of the thorax revealing extensive subcutaneous and mediastinal emphysema.

It is generally considered that the course of mediastinal emphysema together with its accompanying subcutaneous manifestation is mild.[7] This is especially so when its etiology is not secondary to such primary factors as perforation of the trachea, bronchus, or esophagus, association with acute infections such as pneumonia, influenza, diphtheria, and whooping cough, or precipitated by bronchial asthma or tuberculosis. Rest and sedation are generally considered adequate measures of therapy in a benign and self-limiting process. However, when the emphysema is progressive, with extension and increase in the mediastinal pressure, there is an immediate need for decompression by the simplest and most expedient method. In our case, a single incision over the manubrium sternum gave an escape route to the entrapped air. The response to this simple procedure was almost instantaneous, with remarkable relief to the patient and obvious control of the disease process.

A study of the literature reveals that mediastinal and subcutaneous emphysema, or Hamman's Syndrome, occurs in labor as one of the many possible maternal complications. Kosmak[8] estimated the frequency of its occurrence as about one in 2,000 labors. He believes that "the complication occurs more often than this, but as it may pass off without appreciably marked symptoms, an emphysema of this kind, unless extensive, may readily enough escape the attention of the accoucheur." On our obstetric service the incidence of Hamman's syndrome in the gravid patient occurred far less often than the incidence estimated by Kosmak. An accurate rate of occurrence has never been kept; only a rough estimation at best can be made. To the best of my knowledge, the case here reported is the first to occur in any gravid woman before, during, or after labor on this service in the past twenty years, where approximately 100,000 mothers have been delivered.

It is generally agreed that there is a definite tendency for the mediastinal and subcutaneous emphysema to recur. This fact was acutely appreciated, and therefore a careful program of management was outlined for the delivery of this patient to present the best possible prophylaxis.

The majority of reported cases of Hamman's syndrome in labor have been in primiparous women of good health.[9] Our case was a primigravida, who already had had an extensive and serious mediastinal and subcutaneous emphysema just three months before the onset of her labor. This was a definite challenge to the accoucheur. A recurrence had to be prevented. Three paramount prophylactic measures were followed: (1) to provide the maximum amount of maternal comfort and relief from pain with the minimal amount of harm to the newborn in the first stage, (2) to avoid any straining or bearing-down effort in the second stage, and (3) to avoid all pulmonary irritants. The methods used as described above proved equal to the demands of the labor, and the delivery was terminated with mother and newborn infant in good condition.

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MASSIVE AORTIC DISSECTION (DISSECTING ANEURYSM) ASSOCIATED WITH PREGNANCY AND HYPERTENSION

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SINCE Gesell[1] and Erdheim[2] first described "medionecrosis cystica idiopathica," it has been carefully studied by many workers. Until recently, dissecting aneurysms of the aorta have been considered limited to the older aged individuals. In a splendid comprehensive article, Schnitker and Bayer[3] reviewed the literature and found 580 cases reported, of which 141, or 24.31 per cent, were under the age of 40 years. Forty-nine of these 141 cases were in women. Twenty-four of the 49 cases occurred in pregnancy, twenty of these in the last trimester, before labor began. Labor pains had begun in only two cases when rupture occurred. Only two patients of eight in whom blood pressure determinations were recorded showed evidence of hypertension. The author states that "this high incidence of pregnancy and dissecting aneurysms of the aorta in young individuals has not received widespread appreciation." We desire to present an additional case in a 35-year-old pregnant multipara.

Case Report

Mrs. T. Z., aged 35 years, gravida vi, para v, was dead on arrival at the emergency room of the South Side Unit of the Youngstown Hospital Association on Dec. 6, 1947. Her obstetric history showed full-term, uncomplicated pregnancies with living children in 1930, 1932, 1935, and 1938. On Nov. 4, 1939, she was admitted to this hospital in active labor, her last menstrual period having been Feb. 8, 1939. This pregnancy had been uncomplicated with the exception of a small abscess in the right breast. Her blood pressure was 140/100 and urinalysis showed a slight albuminuria. No enlargement of the heart was detected. She had an uncomplicated delivery of a full-term baby boy. Her postpartum course was uneventful. The breast abscess was incised and drained and she was discharged on her eighth postpartum day.

Oct. 8, 1947, nearly eight years after this fifth pregnancy, she consulted a physician in his office. Her last menstrual period was May 15, 1947. Examination showed a blood pressure of 230/116, pulse 104, and weight of 144 lbs. Urinalysis and Wassermann were negative. She returned for five office calls and constantly showed an elevated blood pressure but negative urinalysis. Her last office visit was Dec. 5, 1947, at which time her blood pressure was 232/150. She had a trace of albuminuria and edema of the ankles. She complained of pain in the back of several days' duration. She was given a sedative and complete bed rest was advised. Later that evening she complained of pain shooting down the back of the right leg. Both the pain in the back and leg were severe. The physician visited her at home and administered a sedative. Shortly thereafter she became nauseated. She started for the bathroom but suddenly collapsed and had a convulsion. She was quickly rushed to the hospital but was dead on arrival at the emergency room.

Autopsy.—Externally the abdomen was consistent with an eight months' pregnancy. When the thorax was opened, the pericardial sac was tense and contained approximately 500 c.c. of clotted blood. The heart weighed 600 Gm. On being sectioned, all chambers of the heart were thickened but this was most marked in the left ventricle. The valves were not unusual. Two cm. above the aortic valve on the anterolateral aspect of the aorta, there was a stellate tear in the intima which communicated with a large hemorrhage within the wall of the aorta. There was a communication between this and the pericardial cavity. The wall of the aorta was split. The dissecting aneurysm involved the

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posterior half of the aorta from the aortic valve to the bifurcation and down the right common iliac artery. The intima of the aorta showed moderate arteriosclerosis but the rupture did not occur in an arteriosclerotic plaque. The respiratory tract, gastrointestinal tract, liver and gallbladder, pancreas, and spleen were essentially negative. The kidneys were increased in size, the right weighing 260 Gm. and the left 200 Gm. The capsule stripped fairly readily. The surfaces were finely granular. On cut section, the corticomedullary junction could not be discerned. Within the uterus there was a fetus which was consistent with an eight months' pregnancy. The right ovary measured 10 cm. in diameter and was fluctuant. On being sectioned, thick yellow sebaceous material poured from the cyst and within the wall of the cyst there were several calcified nodules.

Microscopic Examination.—Cardiovascular system: Many of the myocardial fibers appeared normal but some were swollen. There was stasis of blood and the small arteries within the myocardium showed thickened walls and moderate sclerosis of the intima. Sections through the coronaries show parts of them narrow with marked thickening of the wall, especially the intima, distortion of the elastic tissue, heavy deposit of lipid material within the intima and some calcification. Fibrosis involved some parts of the muscle in the thickened coronary. Elastic stains of the coronaries show extensive fragmentation of the elastic tissue within the wall, most marked in the region of the sclerotic plaques. Around the coronaries there is an infiltration with a moderate number of mononuclear cells. Sections of the aorta show severe medial disease in which there are numerous vacuoles and splitting of the muscle fibers in the outer third of the aorta. There is massive hemorrhage extending much of the length of the aorta but numerous vacuoles are shown in the media throughout most of the sections. In addition, there are a few zones in which fibrosis is evident, particularly in the inner parts of the aorta over areas which show arteriosclerosis. In most areas the elastic tissue is fragmented and small cysts around fragmented elastic fibers are widespread. There is diffuse hemorrhage in the periaortic tissue as well as the region of the split media. *Genitourinary System:* The kidneys show changes consistent with moderately advanced arterial and arteriolar nephrosclerosis. The ovary showed a benign teratoma. No significant changes were found in other organs.

Comments.—This is a case of a 35-year-old white woman in her eighth month of pregnancy who had severe hypertension, moderate arteriosclerosis, spontaneous rupture of the aorta into the pericardial sac, and dissection through the entire length of the aorta and into the proximal right common iliac artery.

The relationship of hypertension to the idiopathic medial necrosis is debatable. Schnitker[3] reported hypertension in 50 per cent of his cases below the age of 40 and in two of eight who were pregnant. Rottino[4a] has stated that dissecting aneurysms are found more frequently in patients who are hypertensive. He[4b] also reported studies on aortas from 210 routine autopsies. He had 54 cases of hypertension in this group, of which 51 per cent showed medial degeneration. Karsner[5] states, "The disease occurs in hypertension and this may favor rupture." Mote and Carr,[6] however, found no clinical hypertension in 19 of 26 cases, but no postmortem findings were given concerning these cases.

Erdheim postulated that there may be a hyperepinephrinism in hypertension which might cause local spasm of the vasa vasorum with production of focal ischemia and necrosis in the aortic wall. Several workers have produced dissecting aneurysms experimentally in rabbits by repeated massive doses of epinephrine.

Leary and Weiss[7] produced a dissecting aneurysm arising in an atheromatous ulcer in an animal fed a high cholesterol diet for a long period of time. No blood pressure determinations were available on this animal but in view of a hypertrophied heart and "chronic vascular nephritis" in one kidney, it is reasonable to assume that hypertension was present.

Schlichter,[8] in 1946, attempted to prove the relationship between the vascularity of the aorta and necrotic lesions within the media. He cauterized the adventitia of dogs

and produced zones of necrosis within the media. He noted edema in the outer one-third with focal hemorrhages within twelve hours after coagulation. In the outer two-thirds of the media diffuse necrosis developed when the blood supply was destroyed, provided the collateral circulation was scanty. The inner one-third of the media, however, also showed necrosis and cyst formation even though this part of the artery is nourished mainly from the aortic lumen. In some of his cases, extensive necrosis resulted in aneurysms and occasionally local dissection. He did not succeed in reproducing the massive diffuse necrosis and dissecting aneurysm such as is seen in human cases.

Fig. 1.

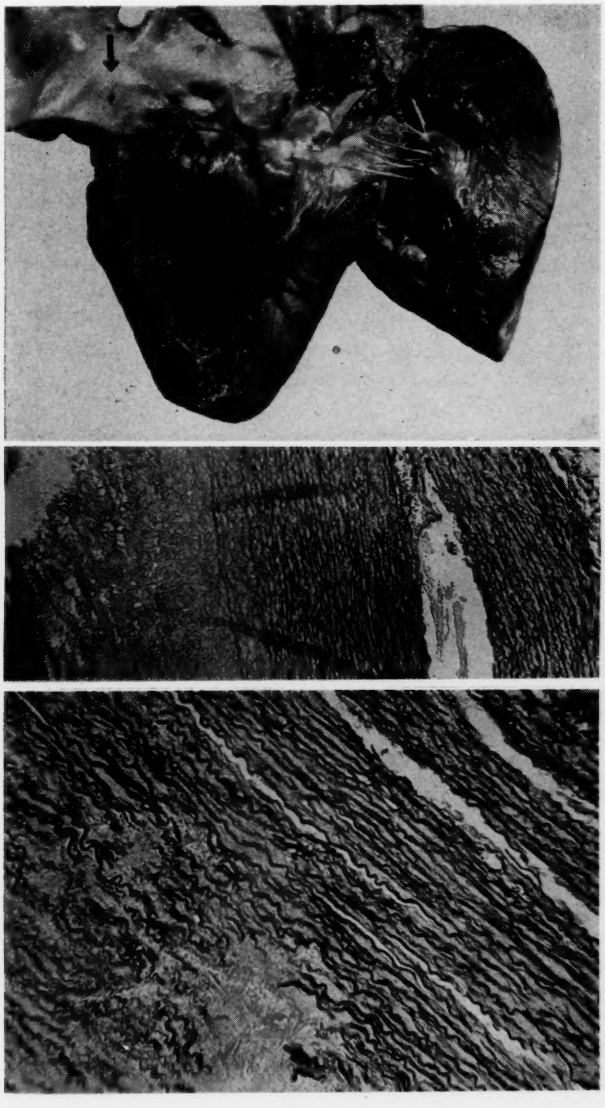

Fig. 2.

Fig. 1.—The aorta showing the site of rupture indicated by the arrow and posterior dissection of the entire length of the aorta and into the right common iliac artery.

Fig. 2.—*A*, Closeup of 600 Gm. heart showing the site of rupture 2 cm. above the aortic valve indicated by the arrow.

B, van Gieson elastic stain of the aorta showing intimal thickening, subintimal atheromatous deposits, disruption of elastic fibers and medial splitting with hemorrhage.

C, van Gieson elastic stain of the aorta showing fragmentation and loss of elastic fibers, loosely arranged fibrous scars and cystic degeneration of the media.

If merely deficient vascularization is the cause of cystic degeneration leading to dissecting aneurysms, one would expect the deeper parts of the muscle to suffer more than those parts of the wall closer to the nutrient arteries. Experience has shown that the dissection is usually in the outer one-third[9] where the nourishment should be relatively good.

The severe hypertension in our patient with excessive stretching of the aorta may have caused disturbance in the blood supply to the wall and rupture of the elastic fibers. Certainly, hypertension cannot be disregarded as an important factor in our case.

Grateful acknowledgment is made to Dr. Horace K. Giffen for his invaluable help and criticism, Mrs. Mary Miles for the photographs, and Miss M. Sokol for compiling material.

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COMPLETE ABRUPTIO PLACENTAE WITH PROLAPSE OF THE PLACENTA

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ABRUPTIO placentae, a complication of the third trimester of pregnancy, occurs about once in two hundred cases according to most authorities. Cosgrove and Conway,[1] in a series of 42,807 live births, found 236 cases, or an incidence of 1:181, while Davis and McGee,[2] in a review of 40,000 cases, found 164 cases, or an incidence of 1:244. A complete abruptio is an even rarer condition, Davis and McGee[2] reporting it as occurring in 1:770 cases in their series and DeLee[3] reporting it as occurring in 1:500 cases. In very exceptional instances the placenta may become separated from its attachment during the course of labor and be extruded in front of the child. Stander[4] believes most of the recorded cases were probably instances of placenta previa—although now and again such an accident may occur even when the placenta is inserted normally—so-called "prolapse of the placenta." True prolapse of the placenta in addition to complete abruptio is a most rare condition, Bland[5] calling it "extraordinarily uncommon," while DeLee[3] states that only eight cases have been reported in the last twenty years. Kobak, Stein and Daro[6] who reported two cases in 1941, state the incidence varies from 1:7,000 cases to 1:45,999 cases (the latter from the German literature).

The following is a case report of complete abruptio placentae with prolapse of the placenta and its presentation at the cervical os in front of the fetal head.

D. S., a Negro woman, age 20 years, gravida iv, para i, first reported to the prenatal clinic on June 26, 1947. Her last menstrual period was on March 4, 1947. She gave a history of a normal full-term baby in her first pregnancy, but her second and third pregnancies ended in spontaneous abortion at two months and one and one-half months in August, 1946, and December, 1946, respectively. At this time her Borner-Lukens complement fixation test was negative; smears were negative for gonococci and her Rh factor was positive; hemoglobin was 65 per cent and red cell count was 4,460,000. General physical examination was negative except for slight bilateral lower abdominal tenderness. The patient was started on routine iron, calcium, and vitamin therapy. Her prenatal course was normal until Aug. 14, 1947, when she was admitted to the hospital, twenty-two weeks pregnant, with a threatened miscarriage. At that time, she gave a history of intermittent spotting during her pregnancy, especially at the usual time of the menses, a fact she had not mentioned previously. She was treated successfully and discharged on Aug. 23, 1947. On Sept. 22, 1947, she was admitted to the hospital, twenty-eight weeks pregnant, because of ruptured membranes, but was not in labor. On admission her abdomen was soft, normal uterine resiliency was present and the patient was seeping amniotic fluid. Her blood pressure was 110/70, with hemoglobin 59 per cent and red blood cells 3,960,000. On the night of Sept. 22, 1947, there was slight vaginal spotting and the passage of a small blood clot. On Sept. 23, 1947, vaginal examination revealed no evidence of placental tissue occluding the internal os or on the area immediately adjacent to the internal os. The patient was returned to bed with no bleeding. On the night following examination, patient had a few irregular pains and slight vaginal spotting. In addition to her complaint of pain in the left lower abdomen at this time there was tenderness to palpation in this area and a diagnosis of partial premature separation of the placenta was made and in view of the history of ruptured membranes it was decided to induce labor medically. Patient was given an enema followed by the administration of two doses of Pitocin,

each 2 minims at thirty-minute intervals. Patient began to hemorrhage profusely and developed pains and strong uterine contractions every two to three minutes. The patient was taken immediately to the delivery room and a vaginal examination revealed the cervical os 3 cm. dilated and the fetal head presenting. Willett forceps were applied to the fetal head and continuous traction made; meanwhile, the patient was given 500 c.c. of plasma. After forty-five minutes, the forceps tore out and the examination at that time revealed the cervical os 8 cm. dilated and the placenta presenting at the internal os in front of the fetal head and completely occluding the os. At this time the patient was having continuous pains and contractions and, under ether anesthesia, the placenta was pushed aside and the membranes penetrated and an internal podalic version was performed and a premature male infant delivered by breech extraction, the placenta being delivered ahead of the breech. The baby was alive on delivery, but lived only eleven minutes. The patient at this time was in extremis from blood loss and was given 1,000 c.c. of whole blood and 1,000 c.c. of 5 per cent glucose in normal saline in addition to the 500 c.c. of plasma and left the delivery room in fair condition. Her condition improved, but on Sept. 25, 1947, her hemoglobin was 44 per cent and red blood cells 3,160,000. The anemia was treated with transfusions and hematopoietics and she made a steady and uneventful recovery, and on Oct. 4, 1947, her hemoglobin was 59 per cent and red blood cells 3,340,000. The patient was discharged on Oct. 5, 1947, in good condition, with fundus involuted normally for the postpartum period and her lochia normal. She was seen six weeks post partum at follow-up examination and her condition was normal at that time except for a moderate secondary anemia.

Discussion

This patient represents a true case of prolapse of the placenta. First, she had a vaginal examination prior to delivery and there was definitely no evidence of placenta previa. Second, at the time of application of the Willett forceps, the fetal head was the presenting part and no placental tissue was palpated. Apparently, after the Willett forceps tore loose from the fetal head, the forceful and potent uterine contractions completely severed the placenta from its attachment to the uterine wall, thus permitting it to prolapse in front of the head since the presenting part was not engaged. Finally, at the time of delivery, the placenta was lying completely in front of the head, which could not be palpated and the placenta was removed before the internal podalic version and breech extraction could be completed.

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626 De Kalb Street

OVARIAN PREGNANCY

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WHILE cases of authentic ovarian pregnancy are now being reported with increasing frequency, the condition is still sufficiently unusual to justify single case reports. In 1940, Novak[1] stated that there were about fifty cases which were acceptable, while Curtis,[2] in 1941, was able to glean sixty authentic cases from the literature. The case presented here is of interest as a typical one of ovarian pregnancy, conforming to all the criteria of Spiegelberg.[3]

CASE REPORT.—M. G., hospital number 168665. The patient was a 22-year-old white woman who had been married for two years, and was nulliparous. Her menstrual cycle had always been normal and regular in all respects. Her last menstrual period occurred on Nov. 10, 1947, and was in no way unusual. On the evening of Dec. 16, 1947, she began to have mild abdominal pain in both lower quadrants, accompanied by moderate diarrhea, nausea, and vomiting. She was seen by a physician, who found only mild abdominal tenderness without rigidity. The blood pressure was 140/80, temperature 98.4°, F., pulse 90, and respirations 18. A tentative diagnosis of gastroenteritis was made at that time.

On the following morning the pain became increasingly severe, and was now accompanied by severe pain in the right shoulder. The shoulder pain was intensified by any change in position. She was admitted to the Mount Sinai Hospital on Dec. 17, 1947. On admission, the blood pressure was 140/80, temperature 99.2° F., pulse 120, and respirations 32. On physical examination by one of us (B. E. U.), the important findings were marked tenderness in both lower quadrants, worse on the left, as well as rebound tenderness. The patient felt most comfortable while sitting erect in bed. As soon as the back rest was lowered in order to perform a bimanual examination, the abdominal and shoulder pain were markedly aggravated. The senior author has observed the latter finding rather commonly in individuals with ruptured tubal pregnancy. Pelvic examination revealed a uterus which appeared to be normal in size, but the region of the left adnexa was exquisitely tender, making the presence or absence of a mass impossible to determine. There was a definite sensation of fullness in the cul-de-sac with extreme tenderness. The remainder of the physical examination was not remarkable.

A diagnosis of ruptured tubal pregnancy was made and a laparotomy was performed. The peritoneal cavity contained 750 to 1,000 c.c. of clotted and fluid blood. The uterus and right adnexa were normal in every respect. The left Fallopian tube was also entirely normal, but the left ovary consisted of a cystic mass measuring 5.5 by 5.5 cm. A globular hemorrhagic mass, 2 by 2.3 cm., extruded from its distal end. Densely adherent to this mass was an old yellow body. The remainder of the ovary was cystic in character, consisting of a thin-walled cyst, lined by a smooth yellow-brown tissue, and containing a few cubic centimeters of clear yellow fluid. The mass was surgically removed without disturbing the Fallopian tube on the affected side. Recovery of the patient was uneventful, and she was dismissed from the hospital on the sixth postoperative day.

Microscopic examination of the grossly described globular mass showed it to be composed of hemorrhagic exudate, in which were enmeshed innumerable chorionic villi lined by both layers of the trophoblast. This mass was located close to the ovarian cortex; however,

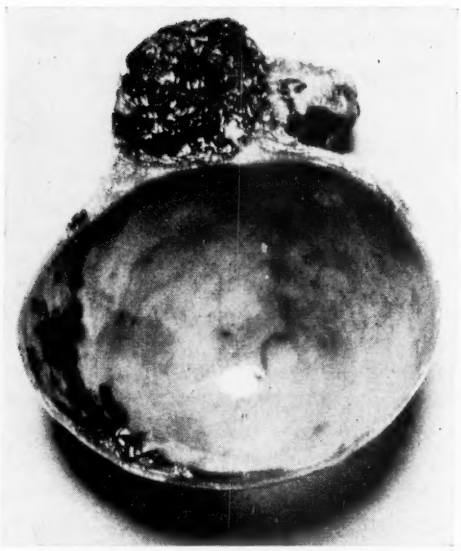

Fig. 1.—Cystic ovary, with corpus luteum and hemorrhagic gestational mass implanted at upper end.

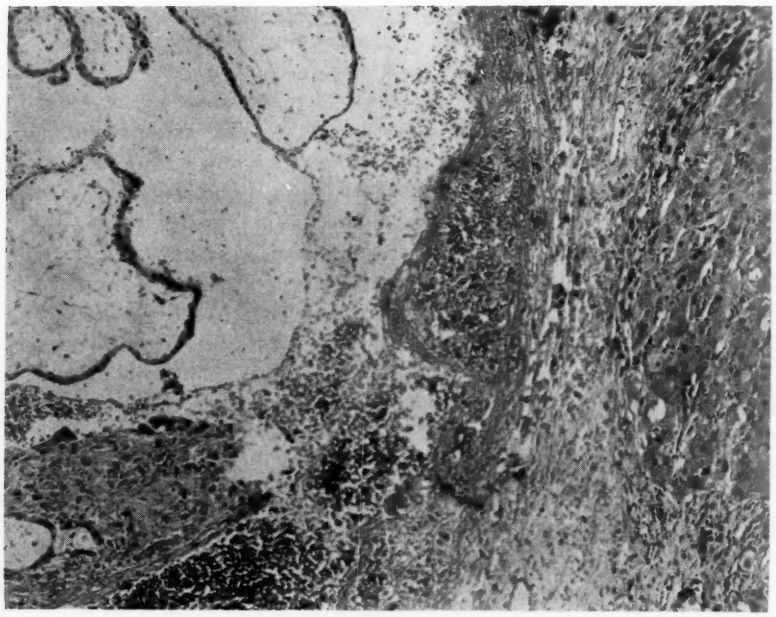

Fig. 2.—Placental villi implanted on ovarian cortex. Lower right field shows corpus luteum. Decidua-like stroma surrounds placental villi in upper left.

it was separated from it by a distinct layer of ovarian parenchyma. The old yellow body described grossly represented a cystic hemorrhagic corpus luteum which was continuous with the previously described cyst.

The findings fulfilled Spiegelberg's criteria.

The additional stipulation added by Norris,[4] that the tube must show no microscopic evidence of pregnancy, could not be demonstrated here since the tube appeared so definitely normal macroscopically that it was not removed for microscopic study.

In general, two categories of ovarian pregnancy are described. In the first, implantation is intrafollicular, though not necessarily into the follicle from which the ovum is discharged. It is now believed more likely that, after its discharge, the fertilized ovum is implanted in the follicle or corpus luteum. The second, or cortical implantation, is the more frequent mechanism, and we believe that the case reported here falls in the latter category.

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ADENOCARCINOMA OF THE OVARY DIAGNOSED BY VAGINAL SMEAR

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NUMEROUS investigators have reported thousands of cases of cancer of the cervix and uterine body diagnosed when the cytology smears are stained with the Papanicolaou stains.[1-7]

Isbell and others[8] have reported malignancies of the bladder, urethra, vulva, and Fallopian tube diagnosed by the smear technique; but there appear in the literature no previous cases of cancer of the ovary diagnosed by this method.

Case Report

Mrs. K. P., white, aged 59 years, weight 250 pounds, was firrst seen on Oct. 4, 1946. She had been bleeding vaginally for past few days. Last menstrual period had been in 1935. She had had a left radical mastectomy on May 31, 1946. The pathologic diagnosis was adenocarcinoma of the breast, Grade II. Following its removal, she had been given a full course of postoperative deep therapy and had had no evidence of metastases. Patient was advised to have a curettage and cervical biopsy, as pelvic examination at this time was negative. This was refused.

She returned again on Feb. 21, 1947, stating that she had had a slight discharge daily since her last visit, but had begun to bleed again on Feb. 20, 1947. Pelvic examination revealed the blood to be coming out of the cervix and, while pelvic examination was unsatisfactory due to a tremendously obese abdomen, the uterus was thought to be enlarged. Vaginal cytology was done according to the Papanicolaou method. Suspicious-looking cells were seen and a curettage was done on March 3, 1947. Microscopic sections showed small fragments of atrophic uterine stroma; there were no glands. Pathologic diagnosis, atrophic endometrium. Examination of the vaginal smears revealed a definite tendency to altered nuclear structure and increase in number of atypical cells. There were present on each of the four stained slides atypical cells exhibiting characteristically hyperchromasia, poor differentiation, and heteroplasia.

On April 4, 1947, biopsy of cervix was done because, when patient was examined on April 3, 1947, there was an ulcerated area at the squamoepithelial junction. Microscopic sections showed a nonstaining mucoid material, through which there were degenerated remnants of outer cervical tissue. The necrotic tissue and mucus were infiltrated with scattered areas of pus and plasma cells. There were no anaplastic cells. Pathologic diagnosis was small fragments of necrotic tissue with pus cell infiltration. There was no evidence of new growth.

The patient continued to have the bloody vaginal discharge off and on. From repeated pelvic examinations, it was definitely felt that the uterus or a possible pelvic mass was enlarging and an exploratory laparotomy was advised. To this the patient finally consented, and this was done on May 20, 1947.

At operation, the patient was found to have bilateral adenocarcinoma of the ovaries extending into the tube. No adherence to other pelvic organs was noted. A bilateral salpingo-oophorectomy, total hysterectomy, and appendectomy were performed. The patient made an uneventful recovery.

The pathologic report by Dr. Lee Howard is as follows:

Gross Appearance.—The appendix appears normal. Body of uterus of average size. On bisection, there is a fibroid in the lateral wall, 1.5 cm. in diameter, and an elongated

fragment or polyp, 4 by 1.5 cm., hanging from the fundus by a narrow pedicle. The left ovary is largely replaced by a cyst, the size of a lemon, in which there is a soft, papillary growth, some of which appears on the outside of the cyst wall. The right ovary is a large mass, the size of a grapefruit, with denuded, papillary projections over the surface. On

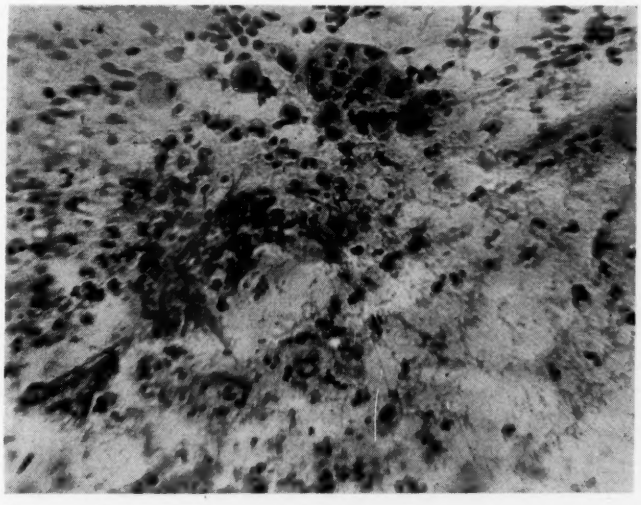

Fig. 1.—Cytology smear. Large malignant cell in center with inclusion bodies and smaller malignant cells surrounding it.

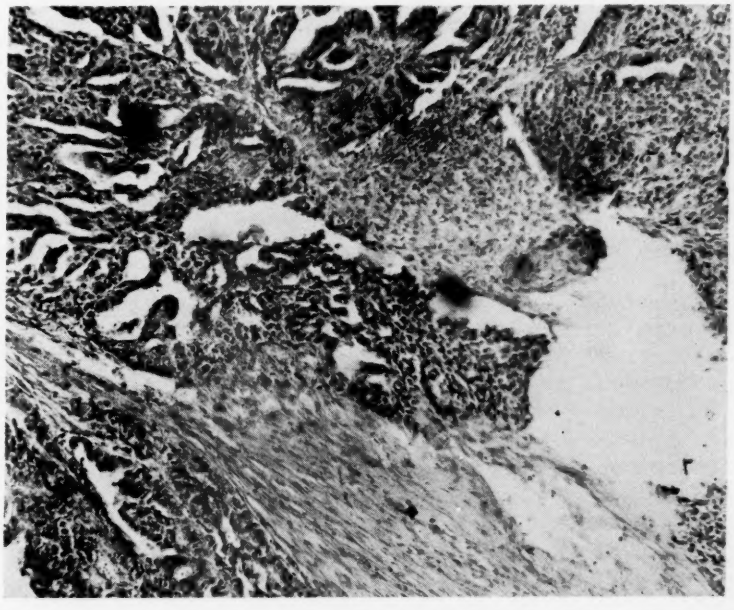

Fig. 2.—Pathologic section of ovaries: adenocarcinoma. Note similarity of the cells on the cytology smear to those on the pathologic slide.

gross section, there is a large, partly macerated growth, 8 cm. in diameter, replacing the ovary, from which two blocks are taken, together with a block from the outside projection, for paraffin sections. Most of the growth is very soft and macerated. Microscopic sections show much the same histology for the three blocks, a cellular growth made up of pale anaplastic cells, some of which have a marked tendency to alveolar and papillary arrange-

ment. There are scattered areas of degeneration and round-cell infiltration. The ovarian growth has penetrated the cyst wall of both ovaries and will almost certainly invade other tissues of the pelvis and abdominal cavities. The cells of this growth are radiosensitive and deep therapy should be tried.

Six weeks postoperatively the patient was given 3,000 r. in air through 8 abdominal portals and this was repeated six weeks later. Patient has been examined repeatedly at intervals of two to three weeks and so far presents no evidence of metastasis.

On October 20, patient complained of pain in the back and right lower abdomen. Pelvic examination was negative, blood pressure 150/90, weight 244 pounds. Anteroposterior and lateral views of the lumbosacral spine and an anteroposterior view of the pelvis, including both hips, revealed demineralization of the bodies of the lumbar vertebrae with some atrophic and hypertrophic arthritic changes, more marked in the upper lumbar region. There is no evidence of osseous metastasis. Patient was given 300 mg. testosterone proprionate in pellets subcutaneously in the right lower abdominal quadrant on Oct. 20, 1947.

Comment

The cells of the vaginal cytology studies and those of the pathologic sections are strikingly similar, indicating that the malignant cells from such sources may be carried into the vagina, either by direct extension or through the fimbriated ends of the tubes.

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CONGENITAL DEFECTS IN THE INFANT FOLLOWING MUMPS DURING PREGNANCY

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INFECTIOUS virus disease in the gravid woman was shown by Gregg[1] to have an effect upon the fetus. This relationship was observed when rubella was contracted during pregnancy. However, it has been generally known before this that any illness may affect embryonic growth and development. During the pandemic of 1918 it was noted that many gravid women who acquired influenza either died or aborted a dead fetus.[2] Goodpasture[3] indicated by studies on the chick embryo and hen that the embryo is more susceptible to the viruses of vaccinia or herpes simplex, as it produces wide areas of infection in the embryo and causes only a mild lesion in the adult.

Later observations by Swan, Tostevin, and others[4, 5] corroborated and supplemented Gregg's original work. They also recorded two cases of mumps. In one of these, the mother had mumps at about three and one-half months of her pregnancy. The baby was born with bluish-white bilateral corneal opacities without ciliary injection. However, when the baby was seen twenty months later, the left cornea was clear and the right one was clearing. The second case of mumps occurred late in pregnancy. Interestingly enough the baby had rubella at the same time. No defects were found in this baby. They observed that the "critical period" for the formation of fetal defects was during the first trimester of pregnancy.

More recently, Swan and Tostevin[6] reported three mothers who had had mumps during pregnancy. Two of these women were infected during their first month of pregnancy, and the third in the seventh month. In the child subsequently born of one of the former, the only abnormality noted was a slight capillary nevus of the right upper eyelid. In the child delivered from the other woman a true anus was absent and the large intestine terminated in the labium majus. There were no abnormalities except for a head-circumference which was slightly below normal in the baby born from the third mother who contracted mumps late in pregnancy.

The case reported herein is one in which mumps had appeared shortly after conception, with the subsequent delivery of a premature living child exhibiting developmental defects of the right ear.

M. F., a 31-year-old white female was a gravida ii, para 0. She was married two years and had had two spontaneous abortions; the first one soon after marriage and the other at the end of the first year. The pregnancies were of short duration, terminating two weeks and three and one-half weeks following skipped periods, respectively. Curettage was performed following the latter. Recovery was without sequelae.

Menses were regular, recurring every twenty-six to twenty-seven days, with a moderate flow of four to five days' duration. Basal body temperatures were recorded, and the monthly cycles were plotted.[7] Four consecutive periods were observed. The temperature curves were of a biphasic pattern, with "ovulation dip" occurring on day eleven of the cycle.

The patient's serology (Mazzini Reaction) was negative; blood group was AB, and she was Rh positive. The blood count showed 12.5 Gm. hemoglobin, 9,650 white blood cells, and 4,510,000 red blood cells. The differential count was normal. Blood cholesterol was 258 mg. per cent, and basal metabolism rate was a plus 6 per cent. The husband's serology (Mazzini Reaction) was negative, blood group A, and Rh positive. The semen specimen was considered satisfactory, the sperm count being 71,000,000 per cubic centimeters. There were 80 per cent motile sperm, 85 per cent were normal, 10 per cent were major abnormalities, and 5 per cent were minor abnormalities.

Conception occurred in the fifth cycle. This was estimated to have taken origin on day eleven, June 5, 1947. On June 13, 1947, nineteen days following the onset of her last men-

strual period, May 26, 1947, she developed a right-sided parotitis, diagnosed as mumps. Following the first skipped period, the patient experienced nausea and vomiting which continued until the time of her next missed period. For this she was treated by diet control and pyridoxine hydrochloride parenterally. A presumptive diagnosis of pregnancy at this time was confirmed by a positive Friedman test. Subsequently, the course of her pregnancy was uneventful.

The total weight gain was 5 pounds, her initial weight being 146 pounds. The expected date of confinement was March 2, 1948. However, spontaneous rupture of the membranes occurred prematurely on Jan. 15, 1948. Active labor began three days later, and she was delivered of a 5 pound, 4 ounce living male child. It was noted that there was a mere crater of skin where the right ear should have been. The external auditory meatus was also absent (Fig. 1). The other ear was apparently normal and there were no other deformities.

Fig. 1.

Comment.—It is interesting to note that the mumps occurred at a very early stage of embryonic development. The pattern of the plotted basal body temperature of four consecutive cycles observed would indicate that the probable date of conception was on the day of the "ovulation dip." This was on the eleventh day following the onset of her last period and eight days before the parotid enlargement appeared.

Mumps is an infrequent occurrence in the obstetric patient,[8] and the number of mothers who have had mumps during pregnancy with subsequent fetal abnormalities is indeed small, as noted by published reports. This case affords the inclusion of another instance of mumps occurring in the first trimester of pregnancy with the birth of an infant exhibiting a developmental anomaly.

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ERRONEOUS PROGNOSIS BASED ON INCORRECT INTERPRETATION OF THE HYSTEROSALPINGOGRAPHY FILM*

ALEXANDER GABRIELIANZ, M.D., CHICAGO, ILL.

MRS. N. S. D., aged 31 years, by profession a ballerina, consulted me because of sterility. She had been married five years and had never become pregnant. Menstruation began at 13 years, regular, four-week type, three to four days in duration. She had occasional dysmenorrhea of a few hours' duration on the first day. Her past history was negative, both medically and surgically. She is subject to nervous tension and unbalanced emotions.

Clinical examination revealed no pathologic findings. On examination, the uterus was in normal anteflexion, slightly enlarged, of normal consistency, symmetrical, freely movable, not tender. The adnexa were not palpable.

The examination of the husband's seminal fluid performed within one hour after intercourse showed the spermatozoa in abundance, vigorously motile, with normal length of tails and normally shaped heads.

Following this examination a hysterosalpingography was performed on the wife on Dec. 27, 1946. The visualization of the internal female organs was preferred to insufflation due to the patient's occupation. Often insufflation leads to excruciating pains in the shoulders and thus invalids the patient. 9 c.c. of Lipiodol were used. After injection of 8 c.c. the patient complained of pain in the uterine region. One more cubic centimeter was added before taking the pictures. 1 c.c. of iodized oil is sufficient to fill up the tubes and pass through the fimbriated end of the tubes. The spill is moderate in amount and gives the possibility of correct interpretation.

Five minutes later the second x-ray picture was taken. The last picture was taken after twenty-four hours. The first picture showed the right tube patent, the upper third of the left tube was visualized. On the second picture there was slight visualization in the proximal end of the right tube; visualization in the left tube was the same. The last picture showed no evidence of oil in the pelvis.

From the pictures I felt that pregnancy was unlikely. Because of the findings on hysterosalpingography, I told her that contraceptives would not be necessary.

The patient left the city but reported by letter later that she had had her last menstrual period on Jan. 27, 1947 and that for the first two months she danced without realizing that she was pregnant, feeling well all the time. I was later informed that the patient was delivered of a baby girl on November 7.

The conclusion is that iodized oil in the left tube passed into the abdominal cavity, perhaps straightening out the kink or relieving some other obstruction in the tube.

25 EAST WASHINGTON STREET.

*Presented before the Chicago Gynecological Society, Nov. 21, 1947.

VAGINAL CALCULUS NOT DUE TO URINARY LEAKAGE OR FOREIGN BODY*

GEORGE A. HAHN, M.D., F.A.C.S., PHILADELPHIA, PA.

B. F., 34 years old, white, unmarried, was seen in my office for the first time on May 26, 1947, for a "checkup" examination because of mild dysmenorrhea and inability to use vaginal menstrual tampons. Past history was noncontributory. The patient had had the usual childhood diseases and pneumonia in infancy. Menstruation had begun at 12, and had been regular, every 21 to 25 days, lasting 4 to 5 days, with a moderate flow. Moderate to severe abdominal cramps usually accompanied the periods. The patient stated that she usually had a slight white mucoid vaginal discharge. Frequent headaches were associated with the menses. Review of systems was within normal limits except for occasional urgency on urination. No history could be obtained of possible introduction of a foreign body into the vagina. General physical examination was within normal limits and catheterized urinalysis was negative throughout. Adequate pelvic examination could not be done because of an almost imperforate hymen through which it was barely possible to pass a uterine sound a distance of about 1.5 cm. The external genitals appeared normal and on rectal examination the uterus and adnexa could not be outlined with any degree of exactitude. Because of the findings, admission to the hospital for hymenectomy was advised.

The patient was admitted to Methodist Hospital and, on June 7, 1947, under sodium Pentothal anesthesia, operation was performed. By means of gentle instrumental and digital manipulation, the hymenal opening was gradually enlarged. However, about two centimeters behind the vaginal introitus, the vagina was found to be almost completely obliterated by a stony, hard mass which was everywhere densely adherent to the vaginal walls. By means of careful probing, a small passageway was found between the stone and the anterior vaginal wall. It was not possible to remove the mass intact since it was wedged so firmly in the vaginal tissues. Finally, the stone was grasped and removed piecemeal with Kocher clamps. There was a marked stenosis of the vagina at about the midportion and the stone had developed in this region. It was particularly fixed to the posterior vaignal wall. There was no connection with the bladder. Bleeding was profuse during the operation and sutures were necessary to control the bleeding at the hymenal site and the midportion of the vagina. The cervix appeared normal and the uterus and adnexa were normal to palpation. At the completion of the operation, a moderately firm vaginal packing was put in place. Despite the obvious trauma of the operative manipulation, the patient withstood the surgical procedure very well. However, at 12:00 midnight on the day of the operation the patient developed chills and fever and her temperature rose to 103.4° F. The vaginal packing was removed at this time and penicillin therapy was instituted. The temperature came down to normal in forty-eight hours and the patient was discharged in good condition. Since discharge from the hospital I have examined her on a number of occasions and when last seen on Dec. 5, 1947, she had an adequate, but snug vagina with slight contracture of the hourglass type in the midportion. She was symptom free, but had employed daily vaginal tampons for three months after operation in order to maintain an adequate vaginal tube.

The pathological report as submitted by Dr. Russell Richardson is as follows: Specimen consists of two calcified pieces five and six millimeters in diameter and some fine "sand." All are dark brown in color.

*Presented before the Obstetrical Society of Philadelphia, Feb. 5, 1948.

The material removed at operation was submitted to Dr. Abraham Cantarow for qualitative analysis and he reported findings positive for: (1) fibrin, (2) hemoglobin, (3) calcium carbonate, (4) phosphate; and negative for (1) ammonia and (2) urate. He stated that the absence of the latter constituents was very good evidence against the possibility that the material was of urinary origin. He stated that the material probably originated in constituents of the blood and vaginal or uterine secretions.

Masson and Appell[1] in 1934 reviewed the literature on vaginal calculi and were able to discover twenty-two authentic cases of vaginal calculi, including their own two cases from the Mayo Clinic.

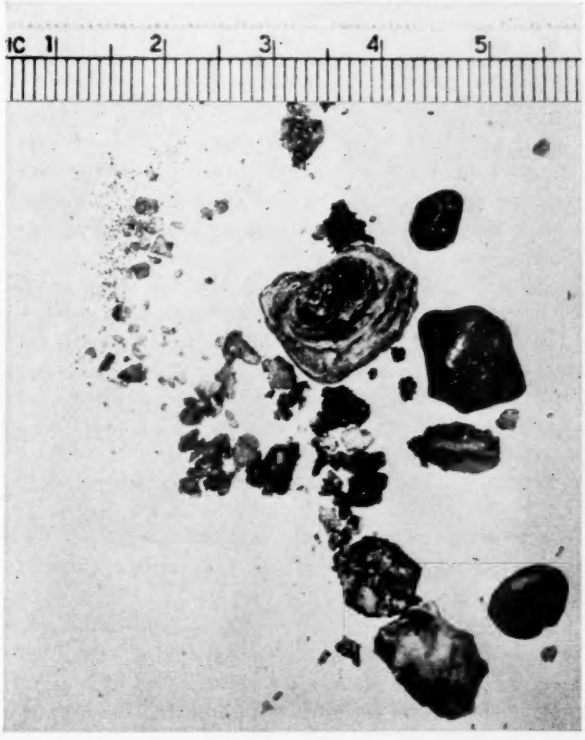

Fig. 1.—Photograph of calculus after removal.

Mohler[2] has maintained that persistent cases of vaginal discharge, of apparently unknown etiology, may occasionally be due to vaginal micturition. One case (reported by Reeb[3]) was of rather indefinite etiology. A seventy-year-old patient had been treated by dilatation, curettage, and intrauterine radium application. Two years later, a large vaginal calculus was found. It was not a calcified tumor histologically and it was not thought to be urinary in origin because of the absence of fistula. It may have arisen from calcification of mucous cells.

Since 1934, several other cases of vaginal calculi have been reported, all associated with congenital or acquired vaginal stricture and the occurrence of urinary leakage into the vagina through a fistula or as a result of urinary incontinence. Stansfield,[4] in 1942, reported a vaginal calculus associated with a vesicovaginal fistula and complicating parturition. He makes the observation in this paper that vaginal calculi were more frequently mentioned in the older literature since the operation of colpocleisis was then in vogue for the relief of vesicovaginal fistulas.

The stone described in this communication apparently arose from the precipitation of salts of the menstrual flow due to stagnation induced by the congenitally small hymenal opening and the apparent congenital vaginal stenosis. I believe we may safely rule out urinary, foreign body, or tumor origin.

Summary

Vaginal calculus is a rare condition. The cases that have been mentioned in the literature were thought to be caused by vaginal cysts, calcified fibroid tumors, or urinary leakage into the vagina. One case (Reeb[3]) was thought to be due to calcification of mucous cells.

A case of vaginal calculus is reported apparently caused by stagnation of the menstrual flow due to an almost imperforate hymen and an apparent congenital stenosis at the midportion of the vagina.

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BILATERAL FOLLICULAR RUPTURE

Report of a Case Seen at Operation*

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THE following is a report of a case of bilateral follicular rupture which was seen at operation. A careful review of the literature fails to reveal any record of previous observation of this phenomenon.

Miss K. J. M., a 27-year-old, single, Navy Nurse from this hospital, was admitted on Dec. 18, 1947, from duty, because of acute lower abdominal pain of fifteen hours' duration. The present illness began three months before admission with a continuous "heavy feeling" in the lower abdomen. This occurred exactly two weeks after the onset of her previous menstrual period and eleven days prior to the next period. This symptom felt similar to an impending period which she knew was not due at that time. There was slight nausea, but no vomiting, and all the discomfort subsided in three days. Two months prior to entrance, at the exact, same, midmenstrual time, a second similar, but not disabling, attack occurred. This likewise subsided in three days. One month before admission, at the same midmenstrual time, a third attack occurred, which was more severe, and caused her to vomit. The pain at this time lasted five days. Fifteen hours prior to admission, while shopping, she was seized with a very sudden attack of excruciating, lower abdominal pain, most severe in the right lower quadrant. This sharp pain was soon superseded by a dull aching sensation. Severe nausea and vomiting ensued and the pain was only partially affected by ½ grain of codeine. This attack occurred on Dec. 17, 1947, fourteen days after the onset of the previous catamenia, which was normal. Bowels and kidney function were normal. She was admitted to the hospital on the next day.

Menstrual History.—Menstruation began at thirteen years of age, and was regular in cycles of twenty-five days, the periods lasting seven days until the present illness, then lasting three days, with less copious flow. There were occasional clots and moderate dysmenorrhea during the first day of flow. There was no leucorrhea. The last flow began on Dec. 3, 1947, and was normal except for two small clots.

Past History.—At 10 years of age, the patient had a tonsillectomy and right mastoidectomy. At thirteen years of age she had jaundice with gall stones proved by x-ray, for which no operation was performed. At 20 years of age an appendectomy was performed for ruptured appendix, but no drain was left in place, and she recovered in two weeks. For six months following this surgery, her periods were irregular. Also, at 20 years, she was hospitalized with a diagnosis of rheumatic fever, with joint pains, epistaxis, chills, fever, and hemorrhagic purpura, the latter of which she has had intermittently since. At 24 years of age she had an operation performed for correction of an internal strabismus of the left eye. At that time, a tentative diagnosis of brain tumor was considered, but eventually ruled out.

Family History.—The family history was essentially negative except that her father died at 39 years of rheumatic heart disease.

Physical Examination.—A well-developed, well-nourished, white female, in acute lower abdominal distress was lying on her right side, with her thighs flexed on her abdomen, and moving only with exceeding caution for fear of accentuating the pain. The abdomen was soft, with moderate involuntary muscle spasm, particularly in the left lower quadrant. No masses or fluid were made out. The liver, spleen, and kidneys were not palpable. Peristalsis

*The opinions published are those of the authors, and in no way reflect the opinion of the U. S. Naval Medical Corps.

was normal to auscultation. There was a well-healed right paramedian scar which was exquisitely tender to palpation, with rebound tenderness referred to it from the left side. No hernias were present. Pelvic examination could not be done because of a virginal introitus. Rectal examination revealed a nontender retroverted uterus, the manipulation of which produced severe lower abdominal pain. The left vault was negative, although the right vault was thought to contain a slightly enlarged, very tender ovary.

At this time a diagnosis of *mittelschmerz* was made, with possibility of endometriosis or a twisted right ovarian cyst kept in mind.

Laboratory Work.—Catheterized urine was found to be essentially negative. Red blood count was 4,230,000, and the hemoglobin was 12.5 grams. The white blood count was 6,400 with a normal differential. The sedimentation rate was 5 mm. in sixty minutes.

Hospital Course.—About three hours after admission, repeated examination revealed moderate lower abdominal muscle spasm, but was otherwise as on admission. Twenty-one hours later there was found to be marked spasticity of the entire lower abdomen, and increased peristalsis to auscultation. Because of these additional findings, an exploratory laparotomy was done twenty-seven hours after admission, and the following findings were noted: the omentum was held by three fingerlike adhesions to the under surface of the old appendectomy scar. These were considered to be inconsequential, and in no way related to the presenting symptoms. The right ovary on its superior-anterior-medial surface showed a classical corpus hemorrhagica, with a prominent stigma actively oozing serosanguineous fluid. The left ovary on its supero-posterior-medial aspect presented a similar but slightly smaller stigma, which also was actively oozing bloody material. The largest diameters of the ruptured follicles were 0.75 cm. and 0.50 cm., respectively. In the cul-de-sac was found approximately 125 c.c. of fresh blood-stained fluid. Except for generalized hyperemia of the pelvis, the remaining findings were essentially negative. The abdomen was closed in layers, and the patient was returned to her room in good condition. The postoperative course was smooth, except for a small wound hematoma, which granulated in well.

Discussion

This case presents a problem in the differential diagnosis of the acute abdomen in the female. In spite of a typical history consistent with the diagnosis of *mittelschmerz,* more serious pathology could not be ruled out without laparotomy. The progressive involvement of both lower quadrants made an additional diagnosis likely.

Subsequent to surgery, the patient's threshold to pain was found to be fairly low, which may have contributed to the initial, complicated, clinical picture.

Statements relative to the fact that bilateral follicular rupture is thought to occur quite frequently have been found in the literature, but there have been no recorded observations of this condition.

Summary

A case of bilateral follicular rupture is described which is thought to be the first such case to be seen at operation and recorded in the literature.

Department of Reviews and Abstracts

Selected Abstracts

Abortion

Tietze, Christopher: Abortion as a Cause of Death, Am. J. Pub. Health **38:** No. 10, Oct., 1948.

The author presents a comparative study of mortality from abortion which shows a striking decline of such deaths in the years 1927 to 1945. The drop in mortality rate in septic abortion has been much faster than that with nonseptic abortion; this supports the view that increased efficiency of treatment of infections with chemotherapy and antibiotics is reflecting itself in this field.

This presentation also offers data showing regional and racial differences in these mortality rates. In general, mortality from abortion has been higher in the Negro than in the white population. It is interesting to note that among white women mortality from abortion is lowest in New England, the Middle Atlantic States, and on the Pacific Coast, but does not vary much according to the size of the community.

This paper concludes with a presentation of comparative international abortion mortality rates. S. B. GUSBERG.

Delfs, E., and Jones, G. E. Seegar: Some Aspects of Habitual Abortion, South. M. J. **41:** 809, Sept., 1948.

Habitual abortion is the term reserved for the patient who has suffered three consecutive, spontaneous abortions. The incidence of habitual abortion is about 0.4 per cent of all pregnancies. The most common etiologic factor is hypothyroidism, having been encountered in 72 per cent of the 39 patients with habitual abortion and was the sole factor in 44 per cent. Pregnandiol excretion values were below normal in 28 per cent. Low chorionic gonadotropin excretion was found in six patients, all of whom aborted. Specific treatment was administered on the basis of laboratory diagnosis, thyroid being given to the hypothyroid; progesterone, to those with low pregnandiol excretion. Chorionic gonadotropin was withheld from those showing a low excretion of this hormone because it is believed that this indicates a morbid or dead fetus. Successful termination of the pregnancy occurred in 67.4 per cent of 33 patients studied, whereas the expectation of spontaneous recovery in this group is something below 27 per cent. WILLIAM BICKERS.

Cancer, Malignancies

Schtirbu, Isaac: Colpocytology in the Diagnosis of Uterine Cancer, Obst. y ginec. latinoam. **6:** 201-210, May, 1948.

The author, reporting from the Gynecology Service at Rawson Hospital in Buenos Aires, gives an analysis of his experiences with the Papanicolaou method in the prebiopsy method for the detection of early carcinoma of the genital tract in 314 patients.

He found negative smears in 263 women and positive smears in 51 cases, an unusually high incidence of 16.2 per cent. He does not mention whether this series represents a special series of cases.

Among the 51 positive cases were 35 cervical carcinomas, all confirmed by biopsies. In 33 cases of this subgroup the indication for biopsy was made by the prebiopsy smear, providing thus a 5.72 per cent error. Seven of nine adenocarcinomas of the endometrium suspected by smear were confirmed by curettage, an error of 12.23 per cent. In addition, the author found perfect agreement of the smear reports in two vulval carcinomas, one clitoral carcinoma, and one case of uterine sarcoma. The over-all percentage of error for the entire series was 2.22 per cent, an unusually low figure, or 7 cases from the series of 314 cases. When divided into "false positives" and "false negatives" (8.9 per cent) the final corrected percentage was 5.59 per cent. Among the cervical carcinomas were 12 cases of Grade I lesions (League of Nations classification).

Schtirbu concludes the Papanicolaou prebiopsy procedure represents as valuable a contribution as the biopsy, periodic pelvic examinations, and colposcopic studies toward earlier detection of genital malignancy and the ultimate reduction of mortality rates in uterine cancer. CLAIR E. FOLSOME.

Kullander, S.: Chorionepithelioma Treated With Stilbestrol, The Lancet, page 944, June 19, 1948.

Nineteen months after expulsion of a hydatid mole, a 20-year-old multipara was found to have chorionepithelioma, with two deposits in an enlarged uterus, theca lutein cysts of the ovaries, and small metastatic deposits in the lungs. After removal of the internal genitals, she was given a total of 3,400 mg. of stilbestrol by mouth and 18,500 mg. parenterally, until her death five months later. The possible beneficial effects of this treatment were shown by: (a) clinical improvement on initiating therapy, (b) reduction of gonadotrope titer following the initiation or large increase of stilbestrol dosage, (c) reduction in size of vaginal and lung metastases on increasing the dosage, and (d) rapid increase in gonadotrope titer and enlargement of vaginal metastasis on temporarily stopping stilbestrol administration. IRVING L. FRANK.

Pund, Edgar R., Dick, Fred, Jr., and Cardwell, E. S. Jr.: The Pathology of Early Carcinoma of the Cervix. The Status of Preinvasive Cancer, South. M. J. 41: 711, Aug., 1948.

Incipient preinvasive carcinoma of the cervix has come into the realm of diagnostic possibility since the introduction of the Papanicolaou smear for cytologic study. There were 86 cases of preinvasive carcinoma, 28 of which were discovered before hysterectomy, and 69 uteri in which routine pathologic examination inadvertantly made the diagnosis. Diagnosis depends entirely upon cytologic detail, namely: nuclear hyperchromatism, increase in the nuclear-cytoplasmic ratio, variations in nuclear size and absence of polarity. The cells in preinvasive carcinoma resemble in all respects the cells of invasive carcinoma. The incidence runs between 1.5 per cent and 3.9 per cent in large numbers of uteri studied following hysterectomy for various causes.

Preinvasive carcinoma is seen in a disproportionate number of pregnant uteri. Basal cell proliferation normally occurring in pregnancy may make differential diagnosis difficult.

Preinvasive carcinoma seems to remain preinvasive for an average of six years. It is possible that some may never progress to the invasive stage. However, the diagnosis demands immediate hysterectomy because such treatment should be followed by 100 per cent cure. A discussion of this paper by Dr. Emil Novak suggests that there is not unanimity of opinion regarding the pathologic criteria for the diagnosis of preinvasive carcinoma. WILLIAM BICKERS.

Endocrinology

Herschberg, A. D., Frommel, E., and Piquet, J.: Serum Cholinesterase and Sex Glands, Annales d'Endocrinologie 9: 117-130, 1948.

The authors find that the sexual hormones exercise a positive influence upon the activity of serum cholinesterase (pseudo-cholinesterase). These activities, especially those concerned with estrogen, are indirect. The pituitary gonadotropins are inhibited by cholinesterase in vivo and in vitro. In clinical practice the excess estrogenic and androgenic activity elevates the serum cholinesterase and in insufficient amounts of the estrogen and androgen the values are decreased.

The authors conclude that the basic lessons found in their studies reside in two theories: (1) the vasodilator action of estrogen is due to an overproduction of acetylcholine locally which becomes in some manner a regulator of estrogenic activity, and (2) the estrogenic receptors characterize themselves by the presence in their tissues of some pseudo-cholinesterase and the acetylcholine production is increased by the estrogenic effect. CLAIR E. FOLSOME.

Varangot, J., and Labatut, M.: The Use of the Quantitative Vaginal Smear in the Standardization of Estrogens in the Woman, Gynéc. et obst. 47: 540-543, 1948.

The measurement of activity of an estrogenic substance in the adult woman is often difficult. To ascertain the minimal effective dose from a minimal quantity of estrogenic substance one is forced to rely upon endometrial biopsies of oophorectomized women. This is obviously inconvenient. The authors therefore evaluated the quantitative study of the vaginal smear as a possible alternative method. Using the Papanicolaou procedure and stains as he outlined it in *Science,* April, 1942, the authors studied vaginal smears in a woman who had had a surgical menopause five years before to learn that 92 per cent of the cells were from the deeper layers. They use as a formula the observations on the menopausal case studied for five years: basal cells 07; prickle cells 87; pyknotic cells 08; granular cells 00 and anuclear cells 00. The first two groups fall into the deep group (Dr. Papanicolaou's C 1 and C 2 or K 1 and K 2—the basal and lower parabasal layers) and the upper three groups are in the superficial layer (Dr. Papanicolaou's C 3, C 4, and C 5 or K 3, K 4, and K 5—the upper parabasal, intermediate or navicular, and superficial or squamous). By application of this study to 25 ovariectomized women, the average formula :02-90/08-00-00: for the smear was found.

In a group of women treated with 50 mg. of estradiol benzoate pellets the average formula was found to be :00-15/60-25-00: In other words, 85 per cent of the cells in the smear were from the third or fourth layer of the vaginal epithelial strata. The writers conclude that when a smear contains more than 70 per cent of the basal or lower basal cells from the deep layer there is an absence of estrogen while a smear showing less than 30 per cent of cells from the deep layer has adequate estrogens. The physiological variations will fall between these two extremes, thus the quantitative vaginal smear does provide in the woman a sensitive guide to evaluating compounds with estrogenic activity. It is more accurate than clinical signs and is much simpler than repeated endometrial biopsies.

CLAIR E. FOLSOME.

Gori, R. M., and Di Guglielmo, L.: Complications Produced by Implantation of Estrogenic Pellets, Anales del Instituto de Maternidad y Asistencia Social 7: 46-51, 1945. "Professor U. Fernandez"

The authors present three cases in which the implantation of 30.0 mg. and 50.0 mg. pellets of diethylstilbestrol dipropionate caused untoward symptoms. One patient complained of mastodynia for several days; on two occasions there occurred prolonged metrorrhagias, the endometrium in one case presenting the picture of cystic glandular hyperplasia. The authors conclude this node of therapy has little place in gynecologic practice save for the isolated menopausal case which does not respond to other therapy. CLAIR E. FOLSOME.

Endometriosis

McGuff, P.: Endometriosis as a Cause of Obstruction of the Intestine, Proc. Staff Meet., Mayo Clin. **23:** 215, 1948.

In sixteen cases of intestinal obstruction caused by endometriosis at the Mayo Clinic, the average age was thirty-nine years; the ages ranged from thirty-one to fifty-four years. Ten of the patients were married; two were separated from their husbands; four had never married. There had been only three pregnancies, with two living children, in the group of married women. A pelvic operation had been done in nine of these cases; eight patients complained of dysmenorrhea. In nine patients the menstrual cycle was regular; in four patients, irregular; two patients had had a hysterectomy done, and one had amenorrhea. Four patients had menorrhagia, and two, metrorrhagia. The average duration of the menstrual symptoms in these cases was six and a half years; and the average duration of the symptoms of intestinal obstruction was 4.8 years. The symptoms of intestinal obstruction included abdominal pain in all cases; constipation at the time of the menstrual period in thirteen cases; abdominal distention in ten cases; obstipation in ten cases; rectal pain, diarrhea, and vomiting in five cases each; and blood in the stools in three cases. On examination, abdominal tenderness was found in seven cases and an abdominal mass in three cases. Complete obstruction of the sigmoid had developed in four cases; partial obstruction developed in six cases, in the sigmoid in three cases, in the rectosigmoid in two cases and in the distal part of the ileum in one case. Chronic intermittent obstruction of low grade occurred in the remaining six cases, involving the sigmoid in three cases, the distal part of the ileum in two cases, and the rectosigmoid in one case. Sigmoidoscopic examination was done in twelve cases, and showed the lesion in nine of these cases; roentgenograms of the colon showed the lesion in nine of eleven cases. A definite diagnosis was not made before operation in six cases; in seven cases a diagnosis of endometriosis as the cause of intestinal obstruction was made; in two cases a diagnosis of carcinoma was made; and in one case, a diagnosis of appendicitis with ileus.

The possibility of endometriosis as a cause of intestinal obstruction should be kept in mind in women thirty to fifty years of age. A history of acquired dysmenorrhea, abnormalities of menstrual periodicity, sterility, rectal or pelvic pain, the presence of associated uterine fibroids (in eight cases in this series) or ovarian cysts (in ten cases), and a long history of progressive intestinal obstruction, especially with exacerbations at the menstrual periods, are suggestive of endometriosis as the cause of the obstruction. The presence of a firm tumor in the rectovaginal septum or of tender palpable nodules also suggests endometriosis. If sigmoidoscopic examination shows an extrarectal mass and intact mucosa, or if the roentgenograw shows a long inconstant filling defect, with sharp, regular border and intact mucosa, such findings are a valuable adjunct for the diagnosis of endometriosis when the lesion is in the lower bowel. When the obstruction is in the ileum, the symptoms are less characteristic and preoperative diagnosis is more difficult.

The treatment of intestinal obstruction due to endometriosis is surgical. If the diagnosis of endometriosis can be made preoperatively in cases of colonic obstruction, resection of the bowel is not necessary in most cases, but temporary colostomy is done if indicated, and panhysterectomy. If the obstruction is in the ileum, ileal resection is indicated and the degree of associated pelvic endometriosis determines whether oophorectomy and panhysterectomy are indicated. In younger women, if obstruction of the ileum or sigmoid is caused by a discrete endometrioma, and the pelvic organs are sufficiently normal to give a reasonable chance of pregnancy, a radical operation on the bowel is indicated, and a conservative operation on the ovaries. In older women, a radical pelvic operation and a conservative operation on the bowel are indicated. In all cases in which a clinical diagnosis of endometriosis causing obstruction of the bowel is made, a biopsy and immediate frozen section should be done at operation in order to rule out carcinoma. In the series of sixteen cases reported, there was no operative mortality, and the prognosis is considered to be excellent.

HARVEY B. MATTHEWS.

Gynecology

Kermorgant, Y.: On the Subject of Genital pH, Presse Méd. **56**: 381, May 29, 1948.

The author, studying the pH of the cervical and vaginal mucus in obese women, records his detail from 300 observations. All determinations were taken after coital abstinence or vaginal instillations for at least 24 hours prior to examination. Mucus was taken with a capillary pipette and determinations were made with a colorimeter. The mucus becomes more acid as one approaches the introitus from the distal end of the canal. Kermorgant found a pH of 7.0 at time of ovulation in cervical mucus but he noted that the cervical alkalinity is greater with increased estrogen activity. When the pH shifts more to the acid side one must consider decreased follicular activity. This correlation of alkalinity pH of cervical mucus increase to hyperestrination and a more acid pH of hypoestrination may be useful in clinical application. CLAIR E. FOLSOME.

Gallo, Delfino: Biomechanics in Gynecology, Ginec. y obst. de Mexico **3**: 181-195, June, 1948.

Gallo, of Guadalajara, reviews from the literature several methods appertaining to evaluation of the possible relation of posture in the erect position in women to the position of genital organs and symptomatic gynecic disorders. He includes in these methods: (1) simple inspection; (2) silhouette graphic studies; (3) measurement of the depth of the lumbar curve; (4) the direct measurement of pelvic inclination; (5) tracings of the spinal curvatures, and (6) roentgenographic studies. The spinal curvature tracings were taken directly by using a unique but simply devised pantograph.

Among the 154 women studied, only forty could be classified as having normal or good posture. Another 113 women exhibited defective posture of the so-called "gorilla" type in different degrees, while one case was classified as "kangaroo" type posture. In summary, he noted a marked tendency toward a change in position of the genital organs in those cases with defective posture. Thirteen figures accompany the article. CLAIR E. FOLSOME.

Monteiro, Aurelio: Histological Basis for the Treatment of Chronic Cervicitis, An. brasil. de gynec. **26**: 23-26, July, 1948.

The author believes the histological patttern of the chronically infected cervix uteri should constitute the choice of method of treatment for this condition. He develops an interesting pathological classification of cervical infections, briefly, (1) endocervicitis; (2) ectocervicitis, and (3) ectoendocervicitis. Each of these three is broken down into three smaller categories. Endocervicitis of Grade I is limited to localized inflammatory changes about the racemose glands with moderate foriglandular round-cell infiltration; Grade II, when the inflammatory process involves deeper tissues, and Grade III, when inflammatory changes are found with hyperplastic squamous metaplasia of endocervical cells, else atypical columnar-cell hyperplasia of endocervical cells.

Ectocervicitis, Grade I, is the true or pseudoerosion with superficial round-cell infiltration; Grade II, erosion or pseudoerosion associated with Nabothian cysts or chronically lacerated cervix, and Grade III, hyperactive basal cells of squamous portio with or without proliferative atypical cornified superficial layers.

Ectoendocervicitis, Grade I, indicates coexistence of Grades I or II of endocervicitis with ectocervicitis; Grade II includes endocervicitis I or II with ectocervicitis I or II while Grade III of the ectoendocervicitis group indicates an association of Grades III of both the endocervicitis and ectocervicitis groups.

Monteiro states that any treatment should be preceded by biopsy to rule out carcinoma and to classify the extension and type of pathologic process so more effective treatment may be done.

For enodcervicitis or ectocervicitis of the Grades I or II and ectoendocervicitis of Grade I, a superficial conization will suffice. He terms this procedure *preconization* and stresses the avoidance of radical treatment because of the obvious complications; in other words, he permits distal drainage with minimal fibrous tissue change. For endocervicitis or ectocervicitis Grade III and ectoendocervicitis, Grades II or III, he advised excision of the cervix. Ten illustrations are included. CLAIR E. FOLSOME.

Laborit, M. H.: Uterine Hemorrhages and Atropine, Gynéc. et obst. **46:** 585-588, 1947.

The author, reasoning that the vasomotor function of the uterus is primarily under the vagal sympathetic dominance and that the cholinergic vasodilators and adrenergic vasoconstrictors influence uterine vessels, feels that there is no reason we should not attribute the same influence on innervation of uterine vessels to control of uterine muscle tonicity. He treated eight cases of functional uterine bleeding with subcutaneous atropine, 1.0 mg. per day for one to two days. In six of these cases he was able to bring about cessation of bleeding. He concludes that this drug should receive more study as a possible nonendocrine method to control functional bleeding. Douay in his discussion points out that Laborit has good reasoning that atropine is not without dangers and we should withhold conclusions pending further studies. CLAIR E. FOLSOME.

Netter, Albert: A Study Upon the Cervico-Uterine Temperature, Presse Méd. **56:** 506-507, July 17, 1948.

The author had reported in a previous study (Annales d'Endocrinologie **8:** 194-199, 1947) that there existed a definite difference between rectal and cervical temperatures. In normal women the cervical temperatures were found to average 0.5 to 0.7° C. higher than the rectal temperatures. The cervicouterine temperature showed variations in the course of the menstrual cycle. While more elevated than the basal rectal temperature patterns, the outline was similar in character except for a rise with subsequent fall of 0.3 to 0.5° C. at ovulation time followed by a secondary rise 0.3 to 0.4° C. It was observed, too, there was an abrupt drop of 0.5 to 0.6° C. about two days before the onset of the next menstruation.

In menopausal patients the author notes a consistently lower cervicouterine temperature as compared to rectal temperature, an average of 0.1 to 0.4° C. The author attributes the rise or fall of the cervicouterine temperature to estrogenic levels and carries out corollary observations of cervicouterine temperatures with vaginal smears. The administration of 2.0 to 5.0 mg. of diethylstilbestrol caused increased cervicouterine temperatures in eighteen of twenty cases so studied.

He concludes that the cervical temperature, without doubt, is a test of estrogenic function but that other multiple factors preclude its complete reliability as a single diagnostic method. CLAIRE E. FOLSOME.

Di Fonzo, N. O.: Endocervical Flora in Pregnancy, Bol. Soc. de obst. y ginec. de Buenos Aires **26:** 548-553, Nov. 13, 1947.

Di Fonzo studied the flora in vaginal and endocervical mucus of sixty pregnant women. He describes elaborate precautions used in taking bacteriological specimens. The endocervix, habitually sterile, can harbor certain discrete microbiological flora without harm to the function of the mucous plug. The acidophilic bacilli and enterococci were most frequently encountered in the vagina and the endocervix. There was found no appreciable difference in bacterial flora in the second or third trimesters. The author concludes that his study stresses the need for sterile conditions attending intrapartum care. A full bacterial spectrum is not included. CLAIR E. FOLSOME.

Miscellaneous

Stuart, Harold C.: Effects of Protein Deficiency on the Pregnant Woman and Fetus and on the Infant and Child, New England J. Med., 1948.

This paper is a review of the current knowledge concerning protein nutrition of the mother, the fetus, and the infant. The first part of the paper deals with the marked increase in protein requirement of the woman during the last half of her pregnancy. The usually recommended diet of 85 Gm. of protein a day is considered adequate. The negative nitrogen balance of the puerperium, especially as it relates to lactation, is discussed and the reserve nitrogen stored during pregnancy is suggested as the protective mechanism against this loss. However, the work of both Burke and Williams is quoted to show that only about 13 per cent of pregnant patients take the advised amount of protein.

The relationship of protein intake to lactation is discussed and a diet containing 2 Gm. of protein per kg. of body weight is recommended for successful lactation.

The relationship of a low-protein diet to amenorrhea, relative sterility, toxemia of pregnancy, various anemias, abortion, and infant mortality rates are discussed.

A correlation between protein intake, prematurity, and infant weight is suggested.

The effect of low-protein diet on the growth and development of infants is discussed and much of the recent literature cited. The following table of recommended protein intake for children of various ages is quoted from Levine.

SUBJECTS	AGE	PROTEIN PER KG. OF BODY WEIGHT (GM.)
Premature infants	1 week to 1 month	6.0-4.4
Premature infants	1 to 3 months	4.4-3.3
Full-term infants	2 days to 3 months	4.4-3.3
All infants	4 months to 1 year	4.0-3.0
Toddlers	1 through 3 years	4.2-2.9
Preschool children	4 through 6 years	3.3-2.5
School children	7 through 9 years	2.6-2.1
School children	10 through 12 years	2.2-1.8
Youths, female	13 through 15 years	1.8-1.5
Youths, male	13 through 15 years	2.0-1.7
Youths, female	16 through 20 years	1.6-1.4
Youths, male	16 through 20 years	2.1-1.7

L. M. HELLMAN.

Gillman, J., Gilbert, C., and Gillman, T.: Rupture of the Uterus of Nutritional Origin—An Experimental Study in the Albino Rat, South African J. M. Sc. **12**: 153, Dec., 1947.

Rats raised on special diets consisting largely of corn and soya bean meals, skim milk, linseed oil, and minerals, developed spontaneous rupture of the uterus in six of twenty-five pregnant animals (24 per cent incidence). The unspecified dietary defect did not prevent sexual maturity and impregnation, but growth rate was reduced, and one animal showed mild rickets. Mechanical causes for uterine rupture were absent, since the animals did not show pelvic deformities or oversize embryos, and since rupture occurred in late pregnancy before the onset of labor.

Uterine rupture is one-sixth as common in European women as in Chinese or in the South African Negro women. In these latter groups, poor obstetric care and malnutrition are the factors in common. Chronic malnutrition may lead to an imperfect development of uterine connective tissue or to degenerative changes in the myometrium, and thus reduce the strength of the uterine wall. Such a situation would explain ruptures occurring before the stress of labor, ruptures in labor without apparent disproportion, and the predisposition to rupture in the obese, metabolically abnormal woman.

IRVING L. FRANK.

Newborn

Shelton, Kost, E., Varden, Arthur E., and Mark, Jerome S.: Experimental Use of Testosterone Compounds in Premature Infants, J. Clin. Endocrinol., October, 1947.

In a previous communication, Shelton and Varden showed that the administration of methyl testosterone apparently increased the survival rate of premature infants weighing less than 2,000 Gm. The present study strongly suggests that there is a marked diminution in the initial weight loss of prematures if these infants are given 5 mg. of methyl testosterone orally, or 4 mg. of testosterone propionate intramuscularly daily. The effectiveness of the testosterone regime is further demonstrated by administering it to one each of four sets of twins with very satisfactory results in so far as maintenance of weight and weight gain is concerned. It is stated that the administration of testosterone causes a decline in urinary nitrogen with no increase in fecal nitrogen and, from this, it is deduced that this nitrogen retention, with the concomitant decrease in sodium, potassium, and chloride urinary excretion, aids in tissue building.

Finally, the authors ridicule any suggestion that the administration of testosterone to infants for a few weeks might interfere with future growth. HERBERT J. SIMON.

Gruenwald, Peter: Mental Deficiency of Prenatal Origin: A Challenge to Preventive Medicine, Am. J. M. Sc. **214,** 605, Dec., 1947.

This paper presents a thorough review of the literature to date on the prenatal causes of mental deficiency, blindness and deaf-mutism. The author submits a classification which includes fetal infection, under which he places syphilis, toxoplasmosis, and rubella: fetal deficiency of iodine or oxygen, also fetal pituitary deficiency; group incompatibility; malformations of unknown origin; and, finally, birth injury resulting from mechanical causes and anoxia.

The problem of eugenics is briefly touched upon. The various causes listed above are then discussed in some detail.

The author concludes that, with the information now available to physicians, it may no longer be said that the antenatal causes of mental deficiency are beyond control. He urges that the most extravagant research program in this field may be lower in cost than the public maintenance of persons whose mental deficiency is of preventable prenatal origin.

A very extensive bibliography, covering all recent contributions to this subject is included. HERBERT J. SIMON.

Richdorf, L. F., and Cady, L. H.: Peritonitis in the Newborn of Intrauterine Origin, Journal-Lancet, page 188, May, 1948.

The authors report a case of peritonitis and intestinal obstruction in an infant during his neonatal period. No bacteriological studies are presented but a postmortem examination is described, which suggests that this peritonitis originated during intrauterine life. The authors postulate a relationship between this disorder in the infant and an episode of "intestinal flu" in the mother, approximately two weeks before delivery. S. B. GUSBERG.

Heilig, W. R., Tudor, R. B., Smith, T., and Platou, E. S.: Report of 26 Cases of Erythroblastosis Fetalis and Survey of the Literature, The Journal-Lancet, page 222, June, 1948.

A review of the advancing knowledge of Rh factors and erythroblastosis fetalis is presented. The authors then describe their experience with twenty-six cases and demonstrate the efficiency of the exchange transfusion and its superiority over the older method of periodic transfusion. The recovery of erythroblastotic infants whose mothers had previously borne sick babies who succumbed to this disease emphasizes the importance of this therapy.

S. B. GUSBERG.

Complications of Pregnancy

Mendoza, J. T.: Incarceration of Six-Month Gravid Uterus, Philippine J. Surg., page 58, March-April, 1948.

A young primigravida admitted in active labor during the sixth month of pregnancy was found to have the pelvic basin completely filled by the uterine fundus, which further rose to a height of 12 cm. suprapubically. The cervix was at the upper pubic border, and could not be felt vaginally. During uterine contractions, the perineum became tense, and the anterior rectal and posterior vaginal mucosae bulged through their respective orifices. There was associated urinary retention with "paradoxical incontinence."

A 25 cm. fetus was delivered by cesarean section, the patient recovering. Incarceration in this case may have been due to a flat pelvis with an overhanging sacral promontory (conjugata vera was 8.5 cm.), which prevented the usually spontaneous ascent of a retrodisplaced gravid uterus.

IRVING L. FRANK.

Chesley, R. F., and Annitto, J. E.: Evaluation of Molybdenized Ferrous Sulfate in the Treatment of Hypochromic Anemia of Pregnancy, Bull. Margaret Hague Maternity Hosp., page 68, Sept., 1948.

This well-controlled study of hypochromic anemia in pregnancy reveals an incidence of 6.6 per cent in a group of patients chiefly in the second trimester.

The presented data show a considerably more efficient hematologic response in those patients treated with a combination of molybdenum sesquioxide and ferrous sulfate over that group treated with ferrous sulfate alone. A smaller group treated with iron in combination with liver-stomach concentrate or folic acid demonstrated no increase in benefit. The authors also present lesser data suggesting that the molybdenized ferrous sulfate preparation was better tolerated, for the group of patients treated with this medication showed no significant gastrointestinal intolerance.

This presentation concludes that such a ferrous sulfate combination is more efficient than the conventional therapy of hypochromic anemia in pregnancy. It states that the precise role of molybdenum in potentiating the iron is, as yet, unknown.

S. B. GUSBERG.

Chesley, L. C.: Does Eclamptogenic Toxemia Cause Chronic Hypertension? Bull. Margaret Hague Maternity Hosp., page 81, Sept., 1948.

The author critically evaluates the literature concerning the relation of the duration of pre-eclamptic toxemia to subsequent hypertension and concurs in the majority opinion which favors such a correlation. He challenges the evidence used by some to label the pre-eclamptic syndrome in patients developing later chronic hypertension as that of latent essential hypertension. He cites the work of his own group which demonstrated a fairly constant relationship between prolonged duration of toxemia and later chronic hypertension whether or not the pregnancy was interrupted or the patient permitted to go into labor; he also presents data which fail to show a late increase in chronic hypertension in post-toxemic patients such as one might expect if these patients were simply latent hypertensives.

S. B. GUSBERG.

Winston, B. J.: Hydatidiform Mole With Eclampsia Occurring in the Fourth Month of Pregnancy, Illinois M. J., page 221, April, 1948.

This report adds another case of hydatid mole with eclampsia to the literature of this subject. This 19-year-old primipara developed convulsions and anuria during the fourth month of her pregnancy and died within twenty-four hours without emerging from coma. Unfortunately, postmortem examination was limited to the abdominal organs.

S. B. GUSBERG.

Tompkins, W. T.: The Clinical Significance of Nutritional Deficiencies in Pregnancy, Bull. New York Acad. Med., page 376, June, 1948.

The nutritional studies of the Philadelphia Lying-In Hospital are presented in this review, with a description of the optimum diet recommended in pregnancy and the disorders resulting from dietary abnormalities. Common dietary indiscretions are discussed and the importance of proper nutritional education and supervision emphasized.

The author presents clinical data supporting his contention that subclinical nutritional deficiencies are very common in pregnancy. He emphasizes the need for vitamin supplements and also stresses correlation between adequate protein intake and the hemoglobin level.

The data presented indicate considerable superiority of a group supervised nutritionally over a nonsupervised group with respect to the incidence of pre-eclamptic toxemia, premature delivery, and infant mortality. It is concluded that inadequate nutrition plays a major role in the etiology of these pregnancy abnormalities.

S. B. GUSBERG.

Puerperium

Ping y Roig, P.: Uterine Rupture in the Puerperium, Anales del Instituto Corachan 1: 13-17, 1948.

The author, chief of Obstetrical Service at the Corachan Institute in Barcelona, reports an unusual case of rupture of the uterus during the puerperium. The patient, a 39-year-old gravida vi, entered the clinic after previous outside attempts to induce labor with oxytocic agents. The uterus was in a state of tetany. A cherry-sized fibroid was noted during the examination. It was part interstitial and part submucous in location. The patient was delivered ultimately, with aid of forceps, of a normal infant. She remained in good condition for the first twenty-four hours after delivery. Suddenly she went into deep shock. Examination revealed a uterine rupture at site extending from the sclerotic tissue surrounding the small fibroid. The author reasons that the suckling of the newborn baby evoked a uterine-mammary reflex which extended the incipient uterine tear beyond the muscle to the serosa. Conservative medical care, antibiotics, and simple repair permitted discharge of the patient on her thirteenth postpartum day. CLAIR E. FOLSOME.

Leon, Juan: Intravaginal Sulfonamide Therapy During and After Delivery, Prophylaxis in Puerperal Sepsis, Anales del Servicio de Obstetricia del Hospital Cosme Argerich 1: 95-103, Dec., 1947.

The author describes his results from the instillation of various kinds of sulfonamide powders into the vaginas of women before and after delivery. He used sulfanilamide, paraminobenzene sulfonamide, sulfathiazole, and sulfadiazine in 494 women at the onset of labor and two hours after the third stage.

The group of patients with normal temperatures was greater (90.8 per cent) than in women not having this treatment (77.5 per cent). The series treated with mercurochrome instillations found 77.7 per cent with normal temperatures as compared to 87.7 per cent treated with oral sulfonamide therapy. Subnormal temperatures were found to be present in only 8.0 per cent of the cases, while a minimum of 1.2 per cent of the total series evinced low-grade febrile responses. The article is well documented with eight tables.

CLAIR E. FOLSOME.

Trillat, Paul, and Dumont, Martial: Paralysis of the External Popliteal Branch of the Sciatic Nerve in Puerperium, Gynec. et obst. 46: 413-419, 1947.

The authors, from Lyon, review the findings in six women, all recently delivered, who developed in the postpartum period transient paralyses of the external popliteal

branch of the sciatic nerve (common peroneal nerve division). The duration of labor in four cases was the following respective number of hours: 44 hours, 17 hours, 26 hours, 17 hours; and in two instances the injury followed rapid delivery. Three were delivered by forceps. Four were localized to the right lower extremity and two to the left side. All but one of the patients complained of violent sacroiliac pain in the last stages of labor, but the transient paralysis appeared at the eleventh, fourth, fifth, tenth, eighth, and the first day after delivery. The paralyses cleared in the following number of days: fifteen days in three cases; twenty to twenty-one days in two cases; and in six months in one case. In the latter case there was an atrophy of 2.0 cm. of the left leg with steppage gait. Treatment consisted of B complex, diathermy heat, and small doses of strychnine salts. CLAIR E. FOLSOME.

Leon, Juan: Maternal Mortality in the Province of Buenos Aires, Archivos de la Clinica Obstetrica y Ginecologica "Eliseo Canton" **3:** 196-215, May, 1944.

The author, former Director General of the Health Department of the Province of Buenos Aires, analyzes the maternal mortality for the years 1929 to 1943, inclusive. There were 1,040,271 deliveries. In this fifteen-year period there were 2,513 maternal deaths, an incidence of 2.38 per cent. There was a gradual decline in the maternal mortality over the fifteen-year period, viz.: 1929 (2.82 per cent); 1934 (3.17 per cent); 1937 (2.94 per cent); 1939 (2.00 per cent); 1942 (1.72 per cent); and 1943 (1.80 per cent). In Peru, in 1940, the maternal mortality was calculated as 6.7 per cent.

In the seven years, 1937 to 1943, the number of deliveries in the hospitals varied from 19.0 to 26.0 per cent of all deliveries. The frequency of operative interference varied from a low of 2.5 per cent in 1942 to 8.1 per cent in 1937 in those cases hospitalized. Abortion, as a sole cause of maternal death, accounted for 8.6 per cent of the total deaths. Eclampsia deaths accounted for 0.9 per cent of the total figure. The principal causes of maternal death were the infectious or septic processes. Eight tables are included. CLAIR E. FOLSOME.

Sheets, Maurice V.: Usual and Unusual Findings in the Cervix Uteri at Time of Repair Immediately Following Delivery, West. J. Surg. **56:** 317, June, 1948.

Small pieces of tissue from the cervix removed immediately following delivery were examined microscopically in 200 consecutive postpartum patients. Decidual reaction occurred in 40 per cent of the specimens. Proliferation of squamous cells marginally invading columnar epithelium, a finding known as epidermization was found in 12 per cent. Metaplasia appeared in glandular epithelium or in a continuation of normal squamous epithelium sufficiently often to be considered normal in pregnancy. Intraepithelial preinvasive cancer occurred only where invasive cancer was found elsewhere in the specimen. Clinically unsuspected, grossly nondiscernible cancer occurred twice in a series of 200 patients and it is interesting to note that clinical symptoms did not appear in these two patients during six months of observation following delivery. These cases would seem to substantiate observations made on rats that pregnancy delays tissue invasion by malignant cells.

WILLIAM BICKERS.

Newman, H. F.: Ligation of the Inferior Vena Cava and Ovarian Veins for Infected Abortion, Am. J. Surg., page 746, May, 1948.

This is a case report of a patient with septic abortion and multiple pulmonary emboli treated by ligation of the inferior vena cava and the ovarian veins with eventual recovery. The postoperative course was marked by wound disruption and mechanical obstruction of the bowel but was free of further pulmonary complications. No follow-up evaluation of her vascular or pelvic status is presented. S. B. GUSBERG.

Sheehan, H. L.: Postpartum Necrosis of the Anterior Pituitary, Irish J. M. Sc., No. 270, June, 1948.

In previous papers published in 1937 and 1940, the author reported nineteen examples of the early stage of postpartum necrosis of the anterior pituitary. At that time there were only twenty-three previous cases reported in the literature. Since 1940, only fourteen additional cases have been reported. In this paper twenty-two cases found at the Glasgow Royal Maternity Hospital between 1940 and 1946 are reported in some detail. As in the previous papers, no pituitary necrosis has been found if the patient died less than twelve hours postpartum. At about twelve to fifteen hours there are definite cellular alterations in the pituitary glands, and by twenty-four to thirty-six hours the changes are easily recognizable. Patients dying within six to eight hours after delivery, of conditions which would be expected to give rise to pituitary necrosis, show a peculiar edematous appearance of the pituitary gland. The changes are not, however, striking enough to make a definite pathological diagnosis. The lesion is always dependent on thrombosis of parts of the vascular supply to the gland, and is invariably associated with severe circulatory collapse either as a result of hemorrhage and/or shock at the time of delivery. In 92 deliveries where death was not associated with circulatory collapse, no pituitary necrosis was found. The obstetrical causes of pituitary necrosis are those which would be expected to provide circulatory collapse. Postpartum hemorrhage with retained placenta was the most prominent, followed by placenta previa and accidental hemorrhage. Rupture of the uterus, inversion of the uterus, prolonged labor, and eclamptic shock have also played a role in the etiology of this condition. There are no recorded cases of pituitary necrosis occurring in the presence of a continuing pregnancy. So far as is known, the circulatory collapse giving rise to pituitary necrosis is always associated with the end of pregnancy. Patients with large areas of pituitary necrosis show certain physiological disturbances in the puerperium which may be related to the pituitary gland. The breasts fail to enlarge, and lactation is inhibited. In a few cases, rather low blood sugar has been found. Two cases are reported in which patients with rather marked pituitary necrosis showed large outputs of urine. Failure of the pubic hair to return or very sparse growth has also been reported. The author estimates that in the 1930s one-eighth of the total maternal deaths would show some degree of pituitary necrosis. He feels that this would be reduced in the 1940s by improved obstetrics and more efficient treatment of those cases showing hemorrhages. The reduction in the total number of maternal deaths through the use of penicillin and sulfonamides will also reduce the absolute number of cases of early necrosis of the pituitary gland found at autopsy. The author estimates that evidence of severe chronic hypopituitarism in patients who have survived severe circulatory collapse during delivery ranges in the region of 1 in 2,500 adult women. L. M. HELLMAN.

Jeffcoate, T. N. A.: Post Partum Necrosis of the Pituitary, Irish J. M. Sc., No. 270, p. 256, June, 1948.

This author feels that clinical hypopituitarism is more rare than Sheehan has indicated. The author gives a short and inconclusive discussion of the treatment of patients with Simmonds' disease with the known existing hormones. Some good results are reported with gonadotrophins, androgens, and estrogens. L. M. HELLMAN.

Cunningham, J. F.: Obstetrical Shock and Pituitary Ischemia, Irish J. M. Sc., No. 270, p. 268, June, 1948.

The author states that early treatment of pituitary necrosis is essential in saving the life of the patient. A patient who has sustained hemorrhage and shock should be carefully observed during the early puerperium. The earliest symptoms of pituitary necrosis are slow recovery, lethargy, low blood pressure, low blood sugar, mental confusion, and refusal of food. Treatment consists primarily of prevention of hemorrhage and shock. In the early

puerperium, if the condition is suspected, carbohydrates, glucose, and saline are necesary. The author states that adrenal cortical extract may have some beneficial results.

L. M. HELLMAN.

Kaltreider, D. Frank, and Dixon, D. McClelland: A Study of 710 Complete Lacerations Following Central Episiotomy, South. M. J. **41:** 814, Sept., 1948.

Great is the difference among obstetricians as to the relative merits of central and mediolateral episiotomy. A comparative study of the two episiotomy techniques is presented. The disadvantage of central episiotomy is thought by some to be the higher incidence of third-degree laceration which it invites. In two of the Baltimore hospitals, rectal laceration followed in 4.49 per cent of a large series delivered with central episiotomy. As one would expect, 92 per cent of these occurred in pimigravidas. The forceps operation following prolonged labor with consequent edema and congestion of the tissue favored extension of the central episiotomy into the rectum. The author wisely refrains from comment upon the relation of the pelvic outlet diameter to the incidence of third-degree laceration because measurements in this series were made by many different physicians. Rectovaginal fistula occurred only once in the entire series. Weighed against these obvious disadvantages of central episiotomy are many advantages which have led the authors to adopt it as a routine.

The central incision increases the soft tissue anterior-posterior diameter; vaginal lacerations are rare; there is less tension on the suture line following repair; pain is minimal; repair is more rapidly accomplished, and with more accurate anatomical approximation. The technique for repair and aftercare is given in some detail. It is probably not advisable to use central episiotomy in the occiput posterior position, but in the great majority of deliveries it is the operation of choice when employed by the trained and experienced obstetrician.

WILLIAM BICKERS.

Venereal Diseases

Rosenthal, Theodore, and Kerchner, George: Venereal Disease in Prostitutes, Am. J. Syph., Gonor. & Ven. Dis., 1948.

A study of women arrested in New York City on prostitutional charges from 1936 to 1946 has revealed a decrease in latent syphilis from 1936 to 1944 but a subsequent increase in the two succeeding years. There has also been an increase in the incidence of gonorrhea during the decade but this may be due to better methods of study rather than to a real increase. The greatest percentage of infectious venereal disease was found in girls under 20 years of age.

L. M. HELLMAN.

Goodwin, M. S., and Farber, M. S.: The Necessity for Treatment of Pregnant Syphilitic Women During Early Pregnancy, Am. J. Syph., Gonor. & Ven. Dis. **32:** 409, Sept., 1948.

This excellent study was set up to evaluate the necessity for retreatment of syphilitics in pregnancy. The authors briefly review the literature of this subject and cite several reported series in which treatment was withheld and normal infants were obtained. They present, thereafter, a moderately large series of patients from their own clinic who had received prior adequate treatment with metal chemotherapy and a small group treated with penicillin, permitted to undertake another pregnancy without further treatment. In no case was a syphilitic infant obtained. There was no increase in fetal mortality over that of children of nonsyphilitic women.

The workers conclude that it is safe to permit a syphilitic patient to undertake pregnancy without further treatment, if her previous antisyphilitic therapy has been adequate, if she is free of clinical signs of active syphilitic infection, and if she is seronegative or, if positive, in low titer only.

S. B. GUSBERG.

Correspondence

Estrogens in Management of Eclampsia

To the Editor:

As the proponent of the use of estrogens in the management of realized pre-eclampsia and eclampsia,[1-4] I was greatly interested in the paper by Dr. O. W. Smith appearing in the November issue of the JOURNAL. It has been a tedious task to compile all my data on this subject, and this letter is accordingly a very tardy comment on the toxemic section of her valuable article.

The writer has used virtually nothing but estrogens in the management of late toxemia cases since 1936. His experience in these twelve years does not quite bear out the statement of Dr. Smith that "stilbestrol administration alone as a definitive measure in late pregnancy toxemia is fruitless." Indeed, the fact that practically nothing else need be used in the management of 92 consecutive unselected pre-eclamptics and 19 consecutive unselected convulsive eclamptics, all private patients, would indicate that such a remark falls somewhat short of the mark. The details of the management of many of these patients have been recorded in the papers listed above.

In the 92 pre-eclamptics there were no maternal deaths, but in the 19 eclamptics the maternal mortality was 10.5 per cent. The fetal mortality in the two groups was respectively 3.4 and 16 per cent. The average birth weight of the children in these two groups, excluding twins, triplets, macerates, and deaths undelivered was, for pre-eclamptics, males, 7 pounds, 8 ounces, and females, 6 pounds, 14 ounces; for eclamptics, males, 5 pounds, 11 ounces, and females, 4 pounds, 2 ounces. Of the whole series only 48 per cent of the pre-eclamptics were induced or sectioned and only 72 per cent of the eclamptics.

In the last 26 consecutive unselected pre-eclamptics so treated, only one patient convulsed (seen in consultation 24 hours beforehand), although the antenatal diastolic pressures (fourth phase) of six of these women at one time or another equalled or exceeded 120. Of these 26 women, 17 had only a trace of albuminuria or less as labor began, and only 14 were induced or delivered by section. The average duration of these pregnancies was 39.5 weeks. Of the twelve examined six weeks post partum, seven had normal blood pressures and no albuminuria. Indeed, the average time post partum required for any albuminuria to decrease to a trace or less was twenty-four hours!

The effect of large doses of intramuscular estradiol benzoate on convulsive patients is of great interest. Prevention of further convulsions is almost invariably achieved after seven hours have elapsed, restoration of orientation and decrease of edema ensue, urine excretion is maintained, and there is as well a *very* rapid decrease of albuminuria after delivery in most instances.

Our estrogen dosage is by no means as large as Smith and Smith have advised. Rarely have we given more than 8 mg. of stilbestrol per day, and even of late have in only a few instances exceeded 15 mg. per day. That these doses are of significant value is best indicated by the fact that one often finds relief of all the toxic signs and symptoms on 15 mg., where 10 mg. have failed, or on 8 mg. where 5 mg. have failed.

It is difficult to believe, after experiences repeated so often, year after year, that the huge dosage of the Smiths is either physiological or needed. Our own empirical evidence suggests that the daily dosage in pre-eclamptics should more nearly approximate the average daily excretion near term, since obviously only partial replacement is necessary. In convulsing cases, a much higher level of dosage is demanded; however, our present routine calls for 100,000 I.U. of estradiol benzoate injected intramuscularly every four hours until all danger of fits has passed, usually thirty-six hours post partum.

Estrogenic therapy for toxemia has little to offer the average practicing obstetrician if it is useless in the last four weeks of gestation when most of his toxic problems become accentuated, and if it is valueless in established cases. But if it is prophylactic one could expect it to be therapeutic in some modification or other, which agrees with our observation.

Any physician can quickly test the validity of our contention for himself, and will then be more optimistic about it, perhaps, than the writer of your leading article for November.

EVAN V. SHUTE, F.R.C.S.(C).

The Shute Institute,
London, Ontario,
January 3, 1949.

References

1. Shute, E. V.: Endocrinology 21: 594, 1937.
2. Shute, E. V., and Barrie, M. M. O.: AM. J. OBST. & GYNEC. 40: 1003, 1940.
3. Shute, E. V.: Am. J. Surg. 59: 478, 1943.
4. Shute, E. V.: In preparation.

Item

American Board of Obstetrics and Gynecology, Inc.

The general oral and pathology examinations (Part II) for all candidates will be conducted at Chicago, Illinois, by the entire Board from Sunday, May 8, through Saturday, May 14, 1949. The Hotel Shoreland in Chicago will be the headquarters for the Board. Formal notice of the exact time of each candidate's examination will be sent him several weeks in advance of the examination dates. Hotel reservations may be made by writing direct to the Shoreland.

Candidates for re-examination in Part II must make written application to the Secretary's office not later than April 1, 1949.

Candidates in military or Naval Service are requested to keep the Secretary's office informed of any change in address.

Applications are now being received for the 1950 examinations. Application forms and Bulletins are sent upon request made to

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ROSTER OF AMERICAN OBSTETRICAL AND GYNECOLOGICAL SOCIETIES*

(Appears in January, April, July, October)

American Gynecological Society. (1876) *President,* Ludwig Emge. *Secretary,* Norman Miller, Ann Arbor, Mich. Next meeting, May, 1949, Hot Springs, Va.

American Association of Obstetricians, Gynecologists and Abdominal Surgeons. (1888) *President,* James R. Bloss, Huntington, W. Va. *Secretary,* Leroy A. Calkins, 418 11th Street, Huntington, W. Va. Annual meeting Hot Springs, Va., Sept. 7-9, 1949.

Central Association of Obstetricians and Gynecologists. (1929) *President,* Earl C. Sage, Omaha, Neb. *Secretary-Treasurer,* John I. Brewer, 104 South Michigan Ave., Chicago, Ill. Annual meeting Oklahoma City, Okla., Nov. 3, 4, and 5, 1949, Municipal Auditorium.

South Atlantic Association of Obstetricians and Gynecologists. (1938) *President,* C. J. Andrews, Norfolk, Va. *Secretary,* E. D. Colvin, 1259 Clifton Road, N.E., Atlanta, Ga. Next meeting, Feb. 9, 10, and 11, 1950, Hotel Roanoke, Roanoke, Va.

A. M. A. Section on Obstetrics and Gynecology. *Chairman,* William F. Mengert, Dallas, Texas. *Secretary,* A. B. Hunt, Mayo Clinic, Rochester, Minn. Annual meeting June, 1947.

New York Obstetrical Society. (1863) *President,* Albert H. Aldridge. *Secretary,* Claude E. Heaton, 205 East 69th St., New York 21, N. Y. Second Tuesday, from October to May, Yale Club.

Obstetrical Society of Philadelphia. (1868) *President,* Carl Bachman. *Secretary,* George A. Hahn, 255 S. 17th St., Philadelphia, Pa. First Thursday, from October to May.

Chicago Gynecological Society. (1878) *President,* Herbert E. Schmitz. *Secretary,* Edward M. Dorr, 30 N. Michigan Ave., Chicago 2, Ill. Third Friday, from October to June, Hotel Knickerbocker.

Brooklyn Gynecological Society. (1890) *President,* Henry S. Acken, Jr. *Secretary,* J. Edward Hall, 429 Clinton Avenue, Brooklyn 5, N. Y. First Friday, from October to May, Kings County Medical Society, 1313 Bedford Ave., Brooklyn, N. Y.

Baltimore Obstetrical and Gynecological Society. (1929) *President,* Houston S. Everett. *Secretary-Treasurer,* W. Drummond Eaton, 11 E. Chase St., Baltimore 2, Md. Meets quarterly at Maryland Chirurgical Faculty Bldg.

Cincinnati Obstetrical Society. (1876) *President,* Edward Friedman. *Secretary,* Lester J. Bossert, 2404 Auburn Ave., Cincinnati 19, Ohio. Third Thursday of each month.

Louisville Obstetrical and Gynecological Society. *President,* Rudy F. Vogt. *Secretary-Treasurer,* Glenn W. Bryant, Louisville, Ky. Meetings fourth Monday of each month from September to May, Brown Hotel.

Portland Society of Obstetrics and Gynecology. *President,* Ronald Frazier. *Secretary-Treasurer,* Gifford D. Seitz, 919 Taylor St. Bldg., Portland 5, Ore. Meetings last Wednesday of each month.

Pittsburgh Obstetrical and Gynecological Society. (1934) *President,* James Hodgkiss. *Secretary,* Clarence H. Ingram, Jr., 902 Peoples East End Building, Pittsburgh 6, Pa. First Monday of October, November, December, January, February, March, April, and May.

Obstetrical Society of Boston. (1861) *President,* M. Fletcher Eades. *Secretary,* H. Bristol Nelson, 1180 Beacon Street, Brookline, Mass. Third Tuesday, October to April, Harvard Club.

New England Obstetrical and Gynecological Society. (1929) *President,* Arthur E. G. Edgelow, Springfield, Mass. *Recorder,* Carmi R. Alden, 270 Commonwealth Ave., Boston 16, Mass. Meetings held in May and December.

Pacific Coast Obstetrical and Gynecological Society. (1931) *President,* Philip H. Arnot. *Secretary-Treasurer,* R. Glenn Craig, 490 Post St., San Francisco, Calif.

Washington Gynecological Society. (1933) *President,* Henry L. Darner. *Secretary,* John Parks, 901 23 St., N.W., Washington, D. C. Fourth Saturday, October, November, January, March, May.

New Orleans Obstetrical and Gynecological Society. (1924) *President,* Woodard D. Beacham. *Secretary,* Harry Meyer, 3439 Prytania St., New Orleans, La. Meetings held October, November, January, March, and May.

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*Changes, omissions, and corrections should be addressed to the Editor of the JOURNAL. The number after the Society's name is the year of founding.

St. Louis Gynecological Society. (1924) *President,* A. N. Arneson. Secretary, Paul F. Fletcher, 634 North Grand Ave., St. Louis 3, Mo. Meetings second Thursday, October, December, February, and April.

San Francisco Gynecological Society. (1929) *President,* Albert M. Vollmer. *Secretary,* Daniel G. Morton, University of California Hospital, San Francisco, Calif. Regular meetings held second Friday in month from October to April, University Club, San Francisco, or Claremont Country Club, Oakland, Calif.

Texas Association of Obstetricians and Gynecologists. (1930) *President,* Julius McIver, Dallas. *Secretary,* George F. Adam, 4115 Fannin St., Houston 4, Tex. Annual meeting, Dallas, Texas, September, 1949.

Michigan Society of Obstetricians and Gynecologists. (1924) (Formerly the Detroit Obstetrical and Gynecological Society.) *President,* O. W. Picard. *Secretary,* Carl F. Shelton, 910 David Broderick Tower, Detroit 26, Mich. Meetings first Tuesday of each month from October to May (inclusive).

Central New York Association of Obstetricians and Gynecologists. (1938) *President,* Chester E. Clark. *Secretary,* Nathan N. Cohen, 713 E. Genesse St., Syracuse, N. Y. Meets second Tuesday of September, November, January, March, and May.

Alabama Association of Obstetricians and Gynecologists. *President,* Gilbert F. Douglas. *Secretary,* Hunter Brown, 1922 South Tenth Ave., Birmingham, Ala.

San Antonio Obstetric Society. *President,* I. T. Cutter. *Secretary,* S. Foster Moore, Jr., San Antonio, Tex. Meetings held first Tuesday of each month at Gunter Hotel.

Seattle Gynecological Society. (1941) *President,* Donald J. Thorp. *Secretary-Treasurer,* Charles D. Kimball, 734 Broadway, Seattle 22, Wash. Meetings held on third Wednesday of each month, Washington Athletic Club.

Denver Gynecological and Obstetrical Society. (1942) *President,* Lyman W. Mason. *Secretary-Treasurer,* Jack M. Simmons, Jr., 638 Republic Bldg., Denver 2, Colo. Meetings held first Monday of every month from October to May (inclusive).

Wisconsin Society of Obstetrics and Gynecology. (1940) *President,* Henry A. Sincock. *Secretary-Treasurer,* Edith McCann, 425 East Wisconsin Ave., Milwaukee 2. Meetings held in May and October.

San Diego Gynecological Society. (1937) *President,* P. L. Martin. *Secretary,* Albert P. Kimball, 233 "A" St., San Diego, Calif. Meetings held on the last Friday of each month.

North Dakota Society of Obstetrics and Gynecology. (1938) *President,* H. A. Wheeler, Grand Forks. *Secretary,* C. B. Darner, Fargo, N. D.

Virginia Obstetrical and Gynecological Society. (1936) *President,* Walter McMann. *Secretary-Treasurer,* L. L. Shamburger, State Health Department, Richmond, Va. Next meeting not announced.

Columbus Obstetric and Gynecologic Society. (1944) *President,* Wayne Brehm. *Secretary,* Zeph J. R. Hollenbeck, 9 Buttles Ave., Columbus, Ohio. Meetings held fourth Wednesday of each month.

Naussau Obstetrical Society. (1944) *President,* Robert S. Millen. *Secretary-Treasurer,* Peter La Mariana, Williston Park, L. I., N. Y. Meetings, bimonthly from October to May.

Bronx Gynecological and Obstetrical Society. (1924) *President,* Charles W. Frank. *Secretary,* Benjamin Karen, 1100 Grand Concourse, New York 56, N. Y. Meetings, fourth Monday monthly from October to May.

Washington State Obstetrical Society. (1936) *President,* John H. Fiorino, Everett. *Secretary,* C. Wendell Knudson, Medical and Dental Bldg., Seattle, Wash. Meetings, first Saturday of April and October.

Kansas City Obstetrical and Gynecological Society. (1922) *President,* Joseph G. Webster. *Secretary,* William C. Mixson, 320 W. 47th St., Kansas City, Mo. Meetings, last Thursday, September, November, January, and March; first Thursday, May, University Club.

Los Angeles Obstetrical and Gynecological Society. (1914) *President,* L. G. Baldwin. *Secretary -Treasurer,* Gordon Rosenblum, 6333 Wilshire Blvd., Los Angeles 36, Calif.

North Carolina Obstetrical and Gynecological Society. (1932) *President,* Wallace B. Bradford. *Secretary,* Richard B. Dunn. Meetings semiannually.

The Society of Obstetricians and Gynecologists of Canada. (1944) *President,* J. Ross Vant. *Secretary,* J. O. Baker, Edmonton, Alberta. Annual meeting, June 18 to 22, 1949, at Jasper Park Lodge, Jasper National Parks.

Akron Obstetrical and Gynecological Society. (1946) *President,* George A. Palmer. *Secretary-Treasurer,* Alven M. Weil, 1030 First National Tower, Akron 8, Ohio. Meetings held third Friday of January, April, July, and October, City Club of Akron, Ohio, Bldg.

Minnesota Society of Obstetrics and Gynecology. *President,* Russell J. Moe. *Secretary,* John Haugen, 100 E. Franklin, Minneapolis, Minn. Meetings held spring and fall.

Miami Obstetrical and Gynecological Society. (1946) *President,* Homer L. Pearson. *Secretary,* John D. Milton, 1104 Huntington Bldg., Miami, Fla. Meetings, second Thursday in January, March, May, and November.

Omaha Obstetrical and Gynecological Society. (1947) *President,* Harley E. Anderson. *Secretary,* Donald C. Vroman, 813 Medical Arts Bldg., Omaha 2, Neb. Meetings held third Wednesday in January, March, May, September, November.

Oklahoma City Obstetrical and Gynecological Society. (1940) *President,* Gerald Rogers. *Secretary-Treasurer,* Arthur A. Hellbaum, 800 Northeast 13 Street, Oklahoma City 4.

Cleveland Obstetrical and Gynecological Society. (1947) *President,* Robert E. Faulkner. *Secretary,* G. Keith Folger, 10515 Carnegie Ave. Meetings on fourth Tuesday of September, November, January, March, and May at University Club, 3813 Euclid Ave., Cleveland 15, Ohio.

New Jersey Obstetrical and Gynecological Society. (1947) *President,* Herschel Murphy. *Secretary,* Benjamin Daversa, Spring Lake, N. J. Meetings semiannually.

Honolulu Obstetrical and Gynecological Society. (1947) *President,* Frank C. Spencer. *Secretary-Treasurer,* H. McLeod Patterson, 202 King Kalakaua Bldg., Honolulu, Hawaii. Meetings third Monday of each month, Mabel Smyth Building.

Oregon Society of Obstetricians and Gynecologists. *President,* Duncan R. Neilson. *Secretary-Treasurer,* David M. Baker, 520 Mayer Bldg., Portland 5, Ore. Meetings held on third Friday of each month from October to May.

National Federation of Obstetric-Gynecologic Societies. (1945) *President,* Ralph E. Campbell. *Secretary,* Woodard D. Beacham, 429 Hutchinson Memorial Bldg., New Orleans 13, La.

Dayton Obstetrical and Gynecological Society. (1937) *President,* A. D. Cook. *Secretary,* L. O. Frederick, 413 Third National Bldg., Dayton 2, Ohio. Meetings, third Wednesday monthly from September through June at the Van Cleve Hotel.

Dallas-Fort Worth Obstetric and Gynecologic Society. (1948) *President,* Asa A. Newsom. *Secretary,* A. W. Diddle, 2211 Oak Lawn Ave., Dallas 4, Texas. Meetings in spring and fall.

Queens Gynecological Society. (1948) *President,* Moses Cohen. *Secretary,* George Schaefer, 112-25 Queens Blvd., Forest Hills, N. Y. Meetings held third Wednesday in February, April, October, and December, at the Queens County Medical Society Bldg.

Mississippi Association of Obstetricians and Gynecologists. (1947) *President,* Walter Simmons. *Secretary,* Richard H. Street, Jr., The Street Clinic, Vicksburg, Miss. Meetings held semiannually.

Florida Obstetrical and Gynecological Society. *President,* Charles J. Collins. *Secretary,* Dorothy D. Brame, Orlando, Fla. Next annual meeting, Belleair, April 10, 1949.

South Carolina Obstetrical and Gynecological Society. (1946) *President,* Manly E. Hutchinson. *Secretary,* J. Decherd Guess, 200 E. North Street, Greenville, S. C. Meetings held in spring and fall.

Buffalo Obstetrical and Gynecological Society. (1946) *President,* W. Herbert Burwig. *Secretary,* Clyde L. Randall, 925 Delaware Avenue, Buffalo, N. Y. Meetings held on the first Tuesday of October through May at the Saturn Club.

El Paso Gynecological Society. (1948) *President,* F. A. Snidow. *Secretary-Treasurer,* C. C. Stapp, 800 Montana Street, El Paso, Texas.

Kentucky Obstetrical and Gynecological Society. (1947) *President,* W. O. Johnson. *Secretary,* Edwin P. Solomon, 910 Heyburn Bldg., Louisville, Ky.

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Which is more resistant to common infant skin irritants

. . . the continuous film of Mennen Baby oil?

. . . the discontinuous film of a baby lotion?

Recent tests by an independent research chemist[1], compare Mennen Baby Oil and a commercial baby lotion, as to their penetrability by common infant skin irritants.

These tests utilized a method originally devised by Schwartz, Mason and Albritton[2] for the evaluation of protective ointments. Film layers of 0.07 mm were achieved, to approximate as closely as possible oil film on infant skin.

The results of these tests, as reported in a leading medical journal[1], indicate:

1. Mennen Baby Oil was impenetrable for periods of *at least three hours* to common infant skin irritants: urine; acidic suspension of feces and aqueous solutions of acid and alkaline reaction.

2. The baby lotion, however, was universally penetrated by all these irritants within *60 seconds*. (The film formed by baby lotion established an aqueous phase between its upper and lower boundary, thus permitting immediate and facile penetration.)

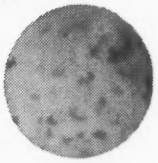
The findings also report:

Mennen Baby Oil: "The film of the baby oil . . . is homogeneous in appearance."

Baby lotion: "Pictures show numerous jagged particles . . . presumably traces of the stabilizing agent and other crystalline ingredients left after evaporation of the aqueous phase."

ELECTRON MICROPHOTOGRAPHS CONFIRM FINDINGS OF PENETRABILITY TESTS

Film of Mennen Baby Oil (0.21 mm), 20,000 X. *Note homogeneous character.*



Film of evaporated baby lotion (0.21 mm), 20,000 X. *Note breaks, irregularity.*

More than 3400 hospitals—the majority of those important in maternity work—use Mennen Baby Oil routinely in the nursery.

mennen baby oils

. . provide continuous film to help protect better

1. Eisner, H.—A Method for the Study of the Penetrability of Liquid and Semisolid Films Used in Skin Protection. Journal of Investigative Dermatology, Vol. 10, No. 4, April 1948. *Reprints upon request.*

2. Schwartz, L., Mason, H.S., and Albritton, H.R.—A Method for the Evaluation of Protective Ointments. Occupational Medicine 1:376-385 (April) 1946.

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American Journal of
Obstetrics and Gynecology

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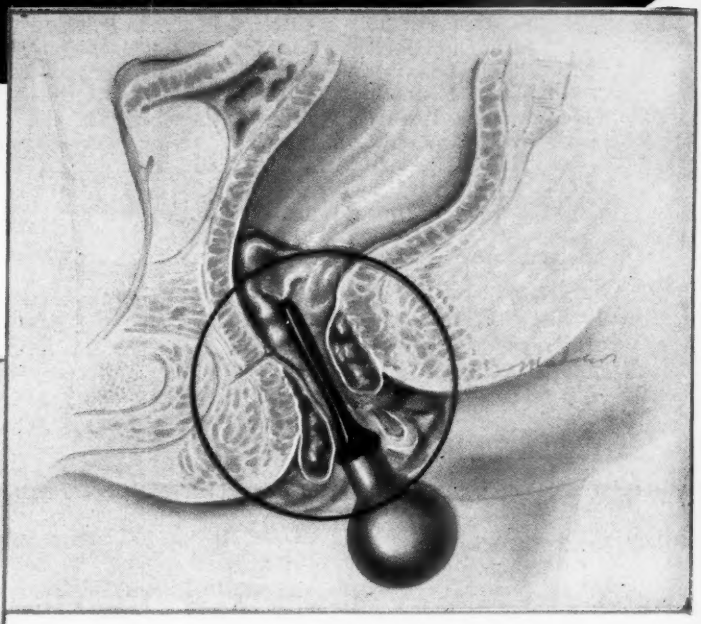

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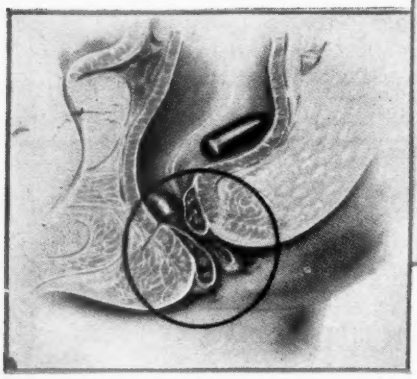
NOT A SUPPOSITORY
NOT AN OINTMENT



With RECTALGAN there is no waiting time for the vehicle to melt or dissolve while at rest in the ampulla.

FORMULA:

Benzocaine	4.5 %
Carbolic acid	1.75 %
Menthol	0.5 %
Ephedrine Alk	0.125%

DISSOLVED IN OILS Q. S.
(MALLON PROCESS)

SUPPLIED: In bottles of 55 cc. (approx. 24 applications) with self-lubricating Rectal Applicator.

AVAILABLE: At all pharmacies.

RECTALGAN — The *Liquid* Topical Anesthesia in HEMORRHOIDS and PRURITUS

when applied, spreads and covers the entire involved pathologic area. It is absorbed rapidly . . . being non-occlusive will penetrate even the minutest fissure . . . and its efficient anesthetic and anti-pruritic action is noted almost immediately. Its simplicity of use and freedom from distasteful features are greatly appreciated by the fastidious patient.

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Strictly an ethical product advertised only to the profession.

Trial supply sent to physicians on request.

MALLON DIVISION of DOHO CHEMICAL CORP., New York 13, N. Y. • Makers of AURALGAN and O-TOS-MO-SAN